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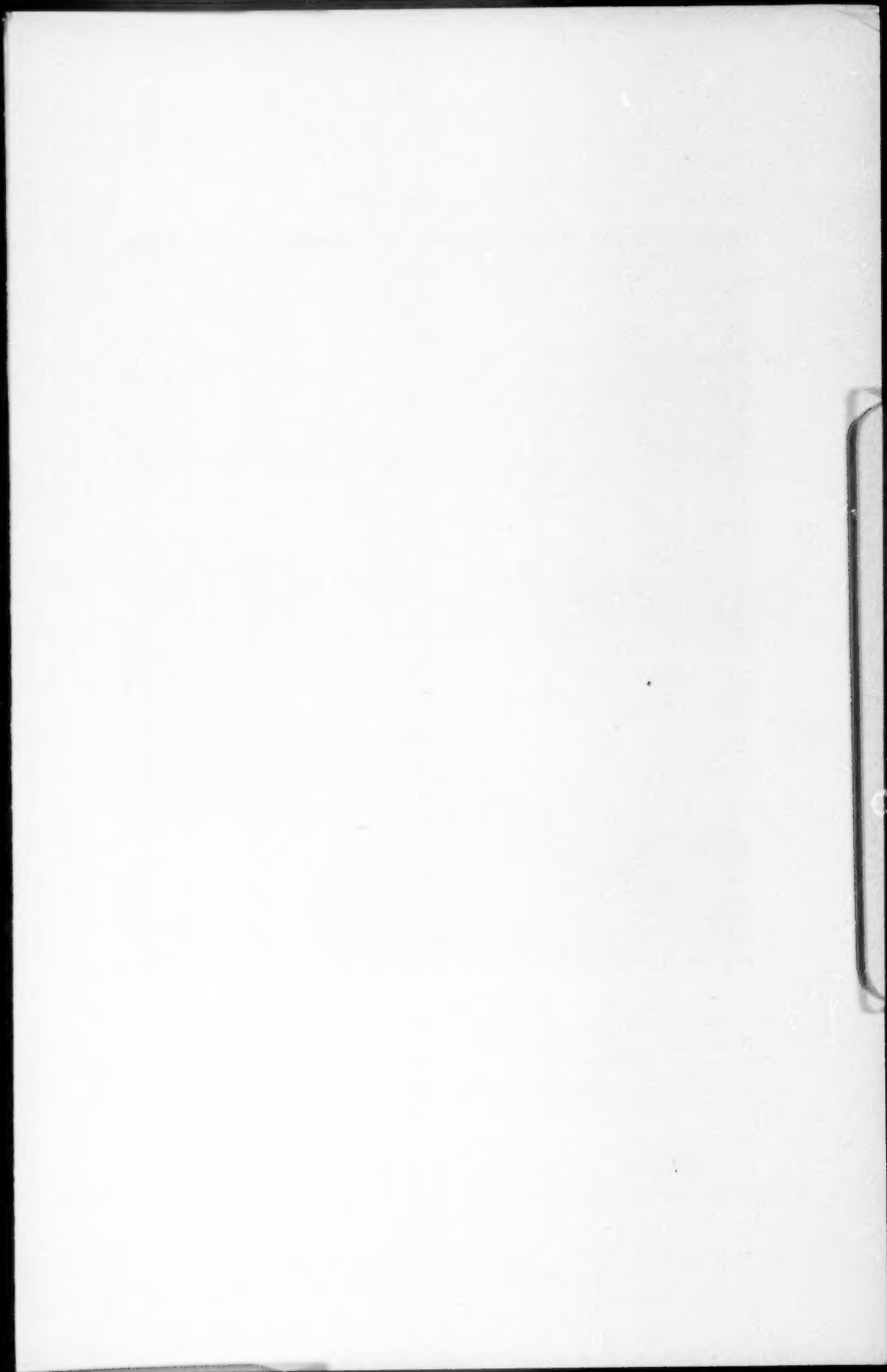
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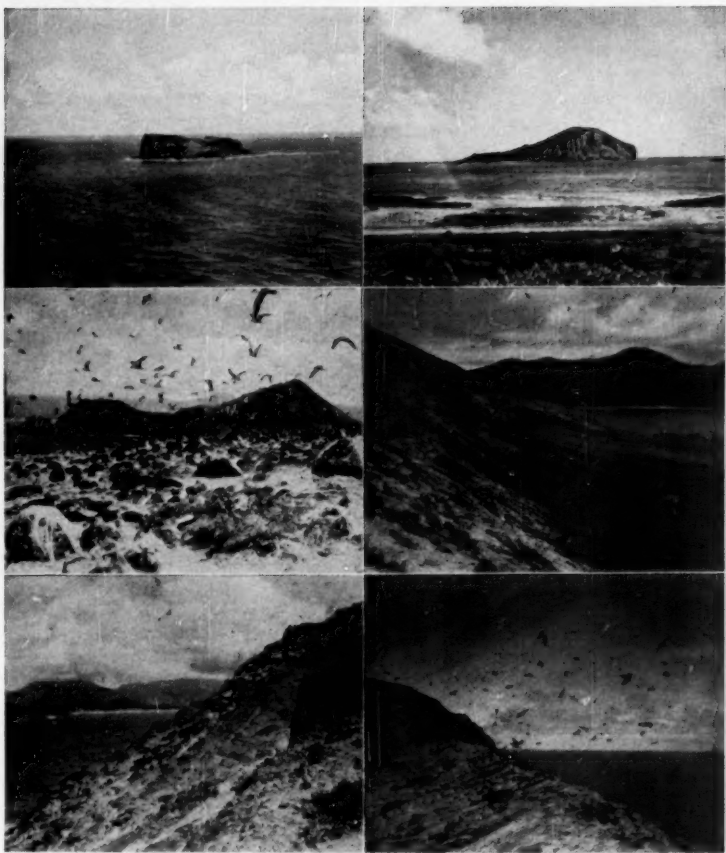
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(Top, left) MOKU MANU. PICTURE TAKEN FROM ULUPAU HEAD, OAHU. (Top, right) WEST SIDE OF MANANA ISLAND, OFF OAHU. (Middle, left) BREEDING AREA OF SOOTY TERNS ON MOKU MANU; ULUPAU HEAD IN NEAR BACKGROUND AND KOOLAU RANGE IN DISTANCE. (Middle, right) INSIDE OF WEST CRATER OF MANANA ISLAND; KOOLAU RANGE IN BACKGROUND. (Bottom, left) SOUTH SLOPE OF MOKU MANU, SHOWING EROSION POCKETS. (Bottom, right) CREST SEPARATING EAST AND WEST CRATERS OF MANANA ISLAND.

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### BIRDS OF MOKU MANU AND MANANA ISLANDS OFF OAHU, HAWAII

BY FRANK RICHARDSON AND HARVEY I. FISHER

THERE are some 17 small islands, all but one within a mile of shore, along the windward or east coast of Oahu, T. H. (Lat. 19–22° N.). Although most of these islands serve as breeding grounds for at least

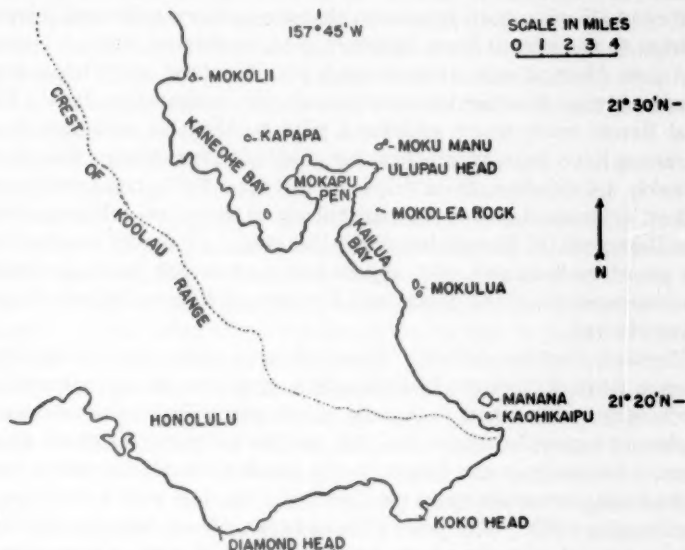


FIGURE 1.—Southeast part of Oahu, Hawaiian Islands, showing the location of the principal offshore islands.

11 species of sea birds, Moku Manu and Manana islands (Fig. 1) are the principal islands as far as variety and number of breeding birds are concerned. Manana, or Rabbit Island as it is frequently called,

is the largest, being some 65 acres in area, while Moku Manu is less than a third as large. Both of these islands are among those set aside (since 1945) by the Territorial Division of Fish and Game as bird sanctuaries with no landing permitted. During the war, Manana was used as a bombing and strafing target at various times; Moku Manu was "buzzed" by naval aviators from nearby Kaneohe Air Station. The effect of these activities on the birds is unrecorded but apparently has not been lasting.

Surprisingly, the avifauna of these two islands was barely known until 1937, and has been little studied since then. Moreover, it was felt that a comparison of the birds of Moku Manu and Manana islands would be of particular interest because different islands attract different species of birds, although they have much in common as regards topography and climate. Furthermore, it was early recognized by Fisher that certain colonies of the same species of breeding birds had markedly different breeding seasons on the two islands. It was to analyze these conditions and suggested problems, and to study aspects of the natural history of all avian species present, that the authors undertook a series of trips to the islands from October, 1946, to August, 1948. During that time 14 trips were made to each island, a total of 28 trips; also, numerous trips to other islets were made for comparative data. Mr. Paul Breese made many additional trips to Manana, and data from his notes have been of much value. Mr. George Munro has given valuable information from trips as early as 1937—apparently the earliest accurate data on the ornithology of these two offshore islets. The University of Hawaii has aided this study, especially in affording the use of its boat and pilot and in making research funds available. The cooperation of the Territorial Division of Fish and Game is also acknowledged.

*Physical Features.*—Moku Manu is separated from precipitous Ulupau Head of Mokapu Peninsula by a deep channel three-fourths of a mile wide. The island is actually of two parts; the main western one is about 18 acres in extent and the smaller outer part is about three acres. Access from the larger to the smaller island is possible over rocks during unusually quiet weather, but even then only to the base of overhanging cliffs. The great cliffs of Moku Manu drop directly into the sea around more than half of the island. A shelving shore of loose boulders extends along some 200 yards on the south (Plate 8, *top*). A low wave-cut bench, up to 200 feet in width, extends around the western end.

Moku Manu is a remnant of a much eroded volcanic cone and is made up of tuff, basalt, and cinders. It has a relatively flat top,

(Plate 8, *middle*) averaging about 165 feet in height but running up to 202 feet. Over half of this upper surface is of shallow sandy soil interspersed with loose rocks. The best and most extensive region of soil and vegetation covers several acres on the fairly gradual south slopes of the island.

Manana is 10.5 miles south and somewhat east of Moku Manu and near the southeast tip of Oahu. It also is three-fourths of a mile offshore but is much larger. It is roughly circular in outline and has a variety of types of shorelines (Plate 8). High cliffs drop into the sea along the north shore. A wave-cut bench extends below the cliffs on the south, east, and northeast sides. Part of the south shore is sandy beach with rocky points and shelves at the sides.

Manana Island is made up of the remnants of two adjoining tuff cones. Less than half of the seaward crater remains, and the surf washes over its old floor. The western cone and its crater (Plate 8, *middle*) make up most of the island. This crater has a complete rim which is highest (almost 200 feet) on the east (Plate 8, *bottom*) where it runs south toward the island's major peak of 361 feet. The floor of the crater is rather flat and extensive and is about 80 feet above sea level. It has soil up to the points where the rim becomes steep and rocky. A large, gently sloping area also covered with soil lies below and outside the crater rim on the southwest.

*Climate.*—Meteorological data for the islands are not available. Neither island has any surface water. The islands are dry most of the year but are subject to occasional heavy rains, especially during the winter. In one January storm, 25 inches of rain fell in 24 hours at nearby Kaneohe Bay. Such rains may assume flood proportions, for large deposits of alluvium have been found on the shores of both islands. Manana has erosion gullies up to 10 feet in depth, although they are not numerous (Plate 8, *top*). The top of Moku Manu is washed during heavy rains by actual sheets of water which have been known to wash away thousands of eggs (Richardson, 1948: 53). Moku Manu appears to receive decidedly less rain than Manana. This is to be expected, as Moku Manu is farther from the main Koolau Range on the east side of Oahu (Fig. 1), which forces air masses upward and brings about precipitation.

Both islands are completely exposed to any northerly or easterly winds. The walls of the crater on Manana afford considerable protection, however, and the outer, south, and west slopes do not receive the worst of the wind. In contrast, the major breeding area on Moku Manu is on the top which is exposed to the full force of winds. Most booby nests, rather large platforms of twigs, completely disappeared

after a heavy wind and rain storm (Richardson, *loc. cit.*), and almost no species were able to stay on their nests. Noddy Terns have been observed to stay on their eggs on Manana even when the eggs became half buried in silt. On Moku Manu, wind and rain sometimes combine to make this impossible.

*History.*—Moku Manu is perhaps the least accessible to humans of any of Oahu's offshore islands. This fact seems to explain to an important degree the breeding of several species there that do not nest on any other of Oahu's offshore islands. Landing on Moku Manu almost always necessitates swimming onto the wave-cut bench, and not infrequently even this is impossible. As a result, the island is rarely visited by unauthorized persons and not often by others. It seems true that during the last century or more, when the bird populations of more accessible offshore islands were depleted by man, and domestic plants and mammals sometimes introduced, Moku Manu remained relatively free from such influences. The much longer canoe trip (there are no beaches near the head of Mokapu Peninsula opposite Moku Manu), the rough channel, and the uncertainty of being able to get on the island must have combined to keep even the old Hawaiians away much of the time.

TABLE I  
PLANT SPECIES ON MOKU MANU AND MANANA ISLANDS

Moku Manu	Manana
<i>Sporobolus virginicus</i> —a grass	<i>Portulaca oleracea</i> —Portulaca
<i>Sesuvium portulacastrum</i>	<i>Atriplex semibaccata</i> —Australian saltbush
* <i>Lycium sandwicense</i>	<i>Trichachne insularis</i> —sour grass
* <i>Chenopodium oahuense</i>	<i>Chloris infata</i> —chloris grass
<i>Portulaca oleracea</i>	<i>Cenchrus echinatus</i> —burggrass
<i>Sida cordifolia</i>	<i>Cocos nucifera</i> —coconut tree
<i>Atriplex semibaccata</i> —Australian saltbush	<i>Nicotiana</i> sp.—tobacco
<i>Tribulus terrestris</i> —puncture vine	

\* Native species.

Manana, in contrast, can usually be approached and landed on without much difficulty. When a small boat cannot land on the beaches, a person can usually jump onto the rocks from a skillfully handled boat or can swim ashore. Protected beaches are opposite the island on Oahu and the rather shallow channel between is rarely very rough. Consequently, Manana has been frequently visited by man for centuries. Even now, although landing is prohibited, unauthorized people occasionally disembark. Munro (1940: 43) cites probably good authority that few or no sea birds were on Manana at about the turn of the century. The Hawaiians may well have killed off the birds for food before this time. The more recent reappearance



and increase in numbers and species of the birds may reflect the disappearance of many of the old Hawaiians and their customs, and the protection of the birds.

*Plants.*—The species of plants identified from the islands are indicated in Table 1. The list may not be complete for either island but includes at least the predominant types. It will be noted that the islands have at least two species in common (of *Atriplex* and *Portulaca*) but are otherwise quite different in their vegetation. Perhaps a significant difference with regard to nesting sea birds is the lack of substantial woody shrubs on Manana. The *Lycium* on Moku Manu often serves as a base for booby nests, and the large twigs of this plant and other fairly large species serve in building up the nest platform. The *Atriplex* on Manana is woody but is quite low and scattered and would probably not serve to support such a nest as that of the Red-footed Booby. Some of the grass on this island grows in clumps two or three feet high and serves as protection to some birds, as young Noddy Terns, although not as nesting sites for any species. The group of coconut trees on Manana may attract certain birds but observations are lacking. The total amount of vegetation is, of course, much greater on Manana and is more dense in general. On both islands the grasses and portulaca begin to dry up late in May or early in June, depending upon the year, and by July all vegetation is brown and sear. Insects, especially Hemiptera, become extremely numerous on Manana at times but this was not observed on Moku Manu. The several species of native plants present on Moku Manu and their absence on Manana corroborate the idea of the relative isolation of Moku Manu and its freedom from many introductions.

*Land Vertebrates Other Than Birds.*—Skinks, *Lygosoma hawaiiensis*, were observed on the outer part of Moku Manu and these constitute the only record of vertebrates other than birds on this island. Manana, however, has a variable population of rabbits of domestic extraction (first introduced sometime before 1900) and house mice, *Mus musculus*. Manana, in addition, has geckos, *Lepidodactylus lugubris*, which make their homes in the coconut trees.

The relationships between rabbits, mice, and birds on Manana did not seem to be particularly significant in the present study. Potentially, the rabbits might defoliate the island to the extent that so much soil would be lost as to preclude burrowing by shearwaters. This possibility has not been indicated during at least two decades and does not seem likely. The number of rabbits seen during our visits (usually of three or four hours' duration) varied from two to about 30, the maximum being observed in June, 1948. Common use of burrows

by shearwaters and rabbits must occasionally occur (as when rabbits are seeking protection) but seems unlikely to be at all frequent. The absence of all rats from the islands is more noteworthy, perhaps, than the presence of other mammals; rats are present<sup>1</sup> on other offshore islands, for example—Popoia and Mokolii. Many species of birds may suffer from predation by rats, and the success of Moku Manu and Manana as breeding islands would probably not be possible if rats were present.

## ORNITHOLOGY

Table 2 lists the species of birds which have been observed on or from Manana and Moku Manu. It will be observed that although the number of species recorded for each island is about the same, the

TABLE 2  
SPECIES OCCURRING ON MANANA AND MOKU MANU ISLANDS

Manana	Moku Manu
BREEDING SPECIES	
1. <i>Puffinus pacificus chlororhynchus</i> — Wedge-tailed Shearwater	1. <i>*Diomedea immutabilis</i> —Laysan Island Albatross
2. <i>Bulweria bulweri</i> —Bulwer's Petrel	2. <i>Puffinus pacificus chlororhynchus</i>
3. <i>Sterna fuscata oahuensis</i> —Sooty Tern	3. <i>*Puffinus nativitatus</i> —Christmas Island Shearwater
4. <i>Anous stolidus pileatus</i> —Noddy Tern	4. <i>Bulweria bulweri</i>
5. <i>Anous minutus melanogenys</i> —Hawaiian Tern	5. <i>Sula sula rubripes</i> —Red-footed Booby
6. <i>Acridotheres tristis</i> —Mynah	6. <i>Sula leucogaster plotus</i> —Brown Booby
	7. <i>*Sterna anathaetus lunata</i> —Gray-backed Tern
	8. <i>Sterna fuscata oahuensis</i>
	9. <i>Anous stolidus pileatus</i>
	10. <i>Anous minutus melanogenys</i>
MIGRANTS	
7. <i>Pluvialis dominica fulva</i> —Pacific Golden Plover	11. <i>Pluvialis dominica fulva</i>
8. <i>Heteroscelus incanus</i> —Wandering Tattler	12. <i>Heteroscelus incanus</i>
9. <i>Arenaria interpres</i> —Ruddy Turnstone	13. <i>Arenaria interpres</i>
10. <i>*Crocethia alba</i> —Sanderling	
VISITANTS	
11. <i>†*Phaethon rubricauda rothschildi</i> —Red- tailed Tropic Bird	14. <i>Fregata minor palmerstoni</i>
12. <i>†*Phaethon lepturus dorotheae</i> —White- tailed Tropic Bird	15. <i>*Liothrix lutea</i> —Pekin Nightingale
13. <i>†Sula sula rubripes</i>	16. <i>Acridotheres tristis</i>
14. <i>†Sula leucogaster plotus</i>	17. <i>†*Diomedea nigripes</i> —Black-footed Albatross
15. <i>†Fregata minor palmerstoni</i> —Frigate Bird	
16. <i>*Nycticorax nycticorax hoaculi</i> —Black- crowned Night Heron	
17. <i>†*Gygis alba rothschildi</i> —White Tern	
18. <i>*Asio flammeus sandwichensis</i> — Hawaiian Owl	

\* Not seen on other island.

† Not seen to land on island.

number of breeding species is decidedly greater on Moku Manu. All of the species, except the Mynah, that are known to breed on Manana, also breed on Moku Manu. The nesting of four additional species on Moku Manu is probably indicative of lack of molestation and of more suitable breeding conditions. Breeding species will be discussed individually in the following text. The same migrants are attracted to each island, with the exception of Sanderlings seen on Manana. The lack of any appreciable sandy beach on Moku Manu would make unlikely the occurrence there of such a species.

Most of the irregular visitants to Manana were seen flying near or over the island. The records of Tropic Birds over Manana and not over Moku Manu seem to be related to the greater proximity of Manana to main island cliffs and canyons frequented by these birds. The presence of rabbits and mice on Manana may explain the several records there of Hawaiian Owls. The Pekin Nightingale recorded from Moku Manu was found dead on top of the island. It is to be considered a purely accidental occurrence and most likely due to a storm. Oceanic species like the Black-footed Albatross are more likely to be seen from Moku Manu for it is off prominent Mokapu Peninsula and is, in effect, farther out to sea.

*Wedge-tailed Shearwater.*—This shearwater nests in rather large numbers on both islands. Estimates of nesting pairs can best be judged by determining the occupied burrows, whether with eggs, young, or adults, in a given area. On Manana there is a large nesting area, with soil suitable for burrows, along the west slopes and on the floor of the main crater. The estimate of breeding pairs was from 2,000 to 3,000 in 1948. The most suitable burrowing area on Moku Manu was much smaller (almost restricted to one part of the south slope) and the number of breeding pairs there is not likely to have exceeded 500.

On Eastern Island of Midway this shearwater commonly nested among or beneath rocks, but it was only occasionally seen to do this on Moku Manu and never on Manana. On Moku Manu, where the soil is shallow, burrows were sometimes merely a groove beneath the low-growing portulaca. On this island about a dozen instances were noted in which shearwaters had dug a little dirt from under the pillar-like nests of the Red-footed Booby and settled down to breed there. The length of burrows varied with soil conditions, burrows typically being about three feet long on Manana but shorter on Moku Manu and on Mokulua Island (one-half mile from shore and about half way between Manana and Moku Manu) where soil was shallow and hard. The greatest measured concentration of occupied burrows on Manana

was about 40 in 10,000 square feet in October, 1946. Smaller areas with relatively greater numbers of nests were undoubtedly present. In October, 1947, on Manana, 16 occupied burrows (about two-thirds of those present) were found in approximately 2,500 square feet, a concentration equivalent to 64 burrows in 10,000 square feet.

No significant differences were observed in the breeding of this species on the two islands. The earliest record of arrival for these shearwaters on Moku Manu was February 28, 1948 (when two pairs were seen under rocks) and on Manana on March 20, 1947 (when many pairs were in burrows). Most burrows on both islands seemed occupied by March 28, 1947. No trips were taken to Manana between February 23 (when no shearwaters were found) and March 20, 1947, but it is probable that the birds returned early in this period. A single shearwater, apparently one of a very few new arrivals, was seen on Mokulua Island on March 7, 1948.

Well grown, young Wedge-tailed Shearwaters were observed on Moku Manu as late as November 9, 1947, when perhaps one-third of the young had left, but no other visits were made here in November and December of that year. Young were studied as late as November 29, 1946, on Manana, when it was estimated that 50 per cent of the young had left. It appeared that almost all adults of this species had left and that the remaining young, although not being fed, were nearly mature and could be expected to leave within a week or two. The ability of young shearwaters to fast for as long as three weeks has been noted by Richardson (1949: 97) and fasting before departure from a breeding ground is a normal occurrence.

The usual complete absence of this species from the islands from approximately December through February (none found on visits of December 14, 1946, and February 23, 1947) indicates a well established annual breeding cycle. It is not known whether migration takes place or the birds just spread over large adjacent sea areas. If they stay about as far north as the Hawaiian Islands (19–22° N. latitude), photoperiodicity, with the effect of increasing periods of daylight on gonad recrudescence, might explain the annual cycle of their breeding. Banding returns show that Wedge-tailed Shearwaters return with considerable regularity to the same islands (Munro, 1944: 22).

*Bulwer's Petrel.*—This species breeds in small numbers on both islands; seven individuals, each with an egg, seemed to represent the population on Manana on June 10, 1948; fewer were seen on Moku Manu. They apparently arrive and leave rather regularly, although our data are sketchy. The first arrival noted was on April 24, 1948,

on Moku Manu, while the latest record was September 13, 1947, on Manana. No birds could be found on the latter island on October 4, 1947.

This petrel nests in deep recesses in rocks and cliffs on Moku Manu and Manana, but on the north islet of Mokulua it nests largely under the low-spreading, large-leaved *Scaevola* which is absent from Moku Manu and Manana. Bulwer's Petrels are much more abundant on this islet; 150 pairs were estimated as present on June 14, 1947. This apparently indicates a preference for this type of breeding habitat which is similar to that occupied on Midway. Yet, they are abundant on Popoia Islet where they breed in the holes and crevices formed by water erosion of rock (Fisher, 1945). The nesting sites on Manana were found without exception in eroded pockets of stratified lava, far back in narrow horizontal crevices. These sites were typically about ten feet above high tide level, and it seemed evident that at times spray would bathe the nesting cliffs. Nests of these petrels were observed to be frequently bathed by spray on Mokulua. On Moku Manu, though, the few Bulwer's Petrel nests found were in deep cracks high above the shore line.

*Sooty Tern.*—The breeding habits of this species were of great interest in our study for, although the Sooty Tern has in the past apparently bred in large numbers on Moku Manu, it just started to breed on Manana, at least in recent years, in 1947. Moreover, this species shows a striking divergence in its breeding cycle on the two islands, its laying and incubating period being about November to March on Moku Manu but April to July on Manana.

Before inquiring into explanations of the above conditions we may best describe the breeding of this tern on the two islands. On Moku Manu, adults are present throughout the year with minimum estimated numbers (under 1,000) in August and September (600 estimated on September 21, 1947), and maximum estimates (10,000 to 15,000) from January through March (15,000 estimated on February 23, 1947). This general picture must be upset at times, as it was in February, 1948, when after severe storms the adult population became very small (400 estimated). Probably the normal breeding cycle on the island is—pairing starts in October, laying starts in November, and raising of young continues through May. Second nestings were apparently made by many birds in December and early January of 1948, after storms destroyed large numbers of eggs. However, very severe storms late that January again destroyed thousands of eggs and young, and it appeared that nesting, for what perhaps would have been the third time for most birds, was rarely attempted.

The progressive extension of the breeding areas of Sooty Terns on Moku Manu with the gradual arrival of large numbers of adults was of particular interest. The high eastern end of the inner island was the first part densely settled by breeding birds, although when re-nesting (probably not of early arriving adults) finally started in April, 1948, after the disastrous storms mentioned above, the new colony was on the southwestern part of the top of the island. Next, by degrees, the large high center (Plate 8, *middle*) of the island was taken over. One small colony present on November 9, 1947, in the north center of the island's top, became enveloped by the main colony of nesting terns by January 11, 1948. The steeper, less desirable sides of the island, with more rocks, vegetation, and other species of nesting birds, were utilized last. On top of the island, the areas with some soil or sand were preferred over the flat, bare, rocky areas. Although perhaps 85 per cent of the nesting of Sooty Terns took place in the dense colonies on top of Moku Manu, late breeding birds especially became scattered over the slopes, but not the cliffs, of the island. The density of the colonies, in contrast, was estimated to be one bird or pair with egg to about every four square feet. Indications were, then, that a large population on Moku Manu caused some birds to nest alongside the usual colony, thus forming a more sparsely occupied fringe.

It might be that Manana received its new breeding colony of Sooty Terns as an overflow from Moku Manu. The Sooty Tern is much less numerous on Manana, the maximum number of adults (in July, 1948) being estimated at 2,000. Birds were first seen on the ground on Manana on March 28, 1947, when 50 to 75 were seen near the region which later became their nesting site.

The differences in the breeding cycle between this small colony and that on Moku Manu, and the possible relations between the two, are of much interest. In the two years of observation, adults were absent from Manana (or only a few seen flying overhead) from October through almost all of March. Eggs were first laid at the beginning of April, nearly six months later than on Moku Manu; on Midway Island laying begins in early May. In 1947, although several hundred adults were sometimes present, apparently only five to ten eggs were laid and perhaps less than five young raised. In 1948, probably between 150 and 200 eggs were laid. The location of the colony was on the upper south slope of the northeast peak and rim of Manana, spreading (in 1948) along the ridge toward the main peak. Sooty Terns were largely surrounded by breeding Noddies but stayed together in an almost continuous, however tenuous, elongated colony.



Some 200 birds were seen on the tip of the main peak on June 8, 1947, but nesting was not known to take place there.

Manana does not afford a large, rather flat and bare area that Sooty Terns appear to prefer for their colonies, as evinced by the large population on Moku Manu. Nevertheless, the breeding of this tern on Manana seems likely to continue to increase, if the island remains protected, since adults and young now here will probably tend to return. The Sooty Tern seems more aggressive than the Noddy and may take over the rather flattened ridge between the peaks on Manana. However, there would appear to be sufficient additional nesting area for both species.

Chapin's work (1946: 313) with Sooty Terns of another subspecies on Ascension Island in the tropical Atlantic is of special interest in comparison to the present study. Chapin established the earlier belief that the Sooty Tern has a very nearly regular nine-months cycle on Ascension (six months on the island and three away), thus breeding very close to four times in three years. Ascension is nearer the equator (8° S. Lat.) than Oahu, a fact which may explain part of this marked difference in breeding cycles. If the recent colonization of Manana was by Sooties from Midway (about 28° N. Lat.) or other Leeward Islands, this might help explain the similarity in cycle between Midway and Manana; the colony on Moku Manu, because of isolation, may have evolved the other annual cycle.

In an undated manuscript compiled by G. H. Castle, Lt. Commander (MC) USNR, on the birds of Palmyra in the South Pacific Ocean is evidence of two breeding seasons for Sooties there. He stated that the main colony arrives about May 15 and that all of these disappear from the island "except for a few stragglers that remain until a few return for the late fall nesting period." The fact that these fall breeders use nesting grounds separate from that used by the spring nesters on Palmyra perhaps indicates different birds breeding in the two periods.

On the other hand, Kelvin Nicholson (personal letter to James P. Chapin, Sept. 28, 1949) is positive that the Sooty Terns on Christmas Island breed twice a year, June and November, and that they use the same breeding grounds each time. He is informed by natives on Kuria Island, which is practically on the equator in the Gilbert Islands, that the terns arrive and lay eggs only in August.

*Noddy Tern.*—This tern nests in considerable numbers on both islands, its populations apparently being fairly stable in recent years. Although less variation was observed in its breeding cycle than in that of the Sooty Tern, comparison of the islands is significant. On Moku

Manu, a few eggs and young were found from early January through May (four eggs observed on January 11, 1948, being the earliest record), but the majority of the eggs were laid, and young raised, from July through September. In July, 1947, apparently a new group of Noddies had started nesting, although a few other pairs had been nesting since January. Maximum numbers of adults (up to 200-300) were seen on Moku Manu in July and August, with a minimum between October and February.

The Noddy Tern is decidedly more numerous on Manana; in fact the breeding population on this island may well be the largest in existence. As many as 7,000 breeding birds were estimated in May and June of 1948, 5,000 to 7,000 in October of 1946, and 5,000 in April and June of 1947. In 1947, it was estimated that about 35 per cent of the adults present had laid eggs by the end of March. The breeding cycle appears to be much more regular on Manana than on Moku Manu. The terns are almost completely absent from Manana from December through February, even though they nest during this time on Moku Manu and on Mokolea Rock to the south. They return in large numbers to Manana in March and soon start egg-laying. It would appear that the large breeding population of Noddy Terns on Manana is on a northern hemisphere cycle but that small populations of this bird, as that on Moku Manu, are not.

Darling's work on seabirds suggests that small size in a colony may result in a slower beginning and less success of the breeding cycle, a factor which might help explain some of the chronological differences in the colonies off Oahu. However, the small colony on Manana started breeding earlier than the large colony on Moku Manu, and the large colony on Manana was six months behind the cycle of the small colony. We may have here a condition similar to that found in Sooty Terns by Chapin, or it may be that both colonies are on a yearly cycle. Obviously, more work needs to be done before any statement of cycle is made. It is notable that the relatively few Sooty Terns nesting in recent years on Manana seem to have a regular northern hemisphere cycle as do the Noddies there; the larger population of Sooties on Moku Manu appears not to have—in contrast to the Noddies on Moku Manu.

Some details of nesting on the two islands may be given. On Manana, Noddies nested chiefly on the barren, rocky, upper slopes and rims of the main crater (Plate 8, *bottom*). They also nested on the patches of soil or pebbles on the south face of the main peak and, in 1947, on the top of the peak itself. Nesting was not attempted on bare rock slopes but a ledge as narrow as four inches enabled nesting

on quite steep slopes. Sites were somewhat different on Moku Manu because of the nature of the island and because of competition with Sooty Terns for space. A group of Noddies nested in 1947 in the rocky outcrop on top of Moku Manu between the two large open areas where the majority of the Sooty Terns nested. Most of the Noddies on this island, though, nest separately and in small groups on the scattered rocky and earthen ledges of the southwest slope.

Nests consisted typically of a slight depression in the ground with a few pebbles around the edge or sometimes pieces of green vegetation, as portulaca and grass, loosely placed on the floor of the nest. Limpet and typical snail shells were found around some of the nests on Manana. Some of these were high on the island, indication of the shells having been carried several hundred yards.

TABLE 3  
BREEDING NODDY TERNS ON MANANA TEST AREA

<i>Date</i>	<i>Eggs</i>	<i>Young</i>	<i>Date</i>	<i>Eggs</i>	<i>Young</i>
March 28, 1947	36 (About 100 nests)	0	April 3, 1948	12	0
June 8, 1947	14 (Laid since March)	45 (At about $\frac{3}{4}$ of nests)	May 16, 1948	70	70
Sept. 13, 1947	0	103 (Unable to fly)	June 10, 1948	40	90
Oct. 4, 1947	0	70-100 (About six unable to fly)			

The breeding population of Noddy Terns on a rather clearly separable part of the south rim of the main crater of Manana was given particular study, and censuses, chiefly of young and eggs, were taken on a number of visits. The area was about 50 yards long with breeding birds scattered along a rounded ridge and down as much as 15 yards on each side. Results of these censuses are tabulated in Table 3. The increase in number of young between June and September, 1947, is probably explained by the fact that eggs may have been laid and hatched between our visits. Some new young may have moved into the area. The test area seemed representative of much of Manana; thus, times of egg-laying, flying of young, etc. can be judged for the whole island.

It was impossible to gather data on the success of nesting because of the length of the breeding season and the constant intermingling of so many stages of the reproductive cycle. From February through July, birds were moving into the test area and starting to nest.

A rather high mortality of nearly-grown Noddies was noted in 1947. By October 4, most of the estimated 950 Noddies on Manana ap-

peared to be flying young; many of the earlier young had already left the island. Well over a hundred dead young were found in a cursory search. Almost all of the dead birds were well grown, fully-feathered, and apparently old enough to fly. However, all the fairly fresh dead birds were very thin with typically only about one-eighth inch of muscle on the sternum. Several non-flying older young were caught and they also were extremely thin. One was so weak it could move only slowly and could not manage its wings. The possibility of disease was not adequately investigated, but the explanation that seemed best to fit our observations was that most adult Noddies had left Manana and the last young to mature were starving. This might well result when two different or unsynchronized cycles are present in a single species breeding on such a restricted area. The parents of the last young may be stimulated to leave too early by the normal departure of early-breeding adults.

The difference in number of breeding Noddy Terns on the two islands is so striking as to demand explanation. Limitation of space on Moku Manu appears to be the chief factor, for when the large numbers of Noddies return in March, the colonies of Sooty Terns are already utilizing a great part of the territory that would probably be most acceptable to the Noddy Terns. Apparently as a result, no large colonies of this tern are found on Moku Manu, and those birds that do nest are scattered on suitable but separate ledges on the south side of the island. Nevertheless, Noddy Terns might nest in much larger numbers on Moku Manu (conditions are more crowded on some breeding islands) if nearby Manana with its large suitable breeding areas were not available.

If space is the limiting factor, we may expect the early-breeding Sooties on Manana to crowd out the Noddies breeding in the summer. It might even be possible that such crowding in the past was responsible for the inception of the off-cycle breeding of some Noddies.

*Hawaiian Tern.*—This species nests in small numbers on Moku Manu and has been reported to nest on Manana. As many as 130 birds were estimated as present on Moku Manu on February 28, 1948, although not more than 25 were recorded on separate visits from April through July, 1947. Many were nesting by the end of April, 1948. Typically, nests were on rocky ledges of cliffs with a low platform of twigs and grass. Some 15 occupied nests, apparently with eggs, were found in April in the large sea-cave on the north side of the island. Some nests were more than 75 yards back in this cave and were almost in darkness. Nests were always at least eight feet above the deep, surging water of the cave. Other nesting areas were on the vertical

cliffs of the northwest end of Moku Manu and on the outer small island. Munro (1944) recorded newly-hatched young on August 18, 1943, but in the period 1946 to 1948 Hawaiian Terns were almost entirely absent from the island from September through February. Curiously, a colony was starting to nest (five new nests with eggs) on Mokolea Rock on January 11, 1948. Hawaiian Terns were observed throughout the year, but not nesting, at such points in the vicinity of Moku Manu as Kailua Bay, Kaneohe Bay, and Mokapu Peninsula.

This species was not found by us to nest on Manana, but Mr. David Woodside has found a few nesting on the northeast cliffs of the island in past years. Conditions may not be too attractive to this species, for Manana's sea cliffs lack desirable ledges. The species does nest on the rougher, less frequented, small island of Kaohikaipu about one-half mile to the south.

It is interesting to note that this species which is congeneric with the Noddy, exhibits much the same pattern of nesting throughout the year—with major variations in time being associated with different colonies, rather than with seasons. On Midway Island (Fisher and Baldwin, 1946; Fisher, 1949) the main breeding period of the Noddy is in the winter months, but the Hawaiian Tern there breeds in more or less constant numbers throughout the year.

*Laysan Albatross.*—This is one of five species of birds that has been found to breed on Moku Manu but not Manana. The first known record of the breeding of this albatross on Moku Manu, or anywhere in the main Hawaiian group, has been described by Fisher (1948: 66). One pair then raised a single young which was observed from late February, 1947, when newly hatched, to mid-July, when it was ready to fly. On January 11, 1948, a deserted albatross egg was found in the same spot the above young had occupied, but no further nesting was attempted nor were adults seen near the island. One adult, perhaps a parent of the above egg, was observed repeatedly on the south side of Mokapu Peninsula, about three miles south of Moku Manu, on December 14, 1947. Probably the unusually severe storms in January led to the desertion of the above albatross egg and discouraged further breeding.

*Christmas Island Shearwater.*—This species was present on Moku Manu by late February in both years of our study. Fourteen individuals, each with an egg, were counted on April 19, 1947. Young were raised and all birds gone by October. Breeding was restricted to a small area (about 100 by 30 feet) of outcropping rock and rock piles partly covered by low brush, toward the eastern end of the top of Moku Manu's main island. Nests were usually well under or back

between rocks, but some were almost out in the open under only a partly concealing ledge of rock. Apparently this is the only area on Moku Manu acceptable to this shearwater. On Manana there is no closely similar habitat and this species was not recorded there. On Eastern Island of Midway, Fisher and Baldwin (1946: 6) and others have found this species breeding in small numbers under *Scaevola* plants; eggs were present in early May when the species was first observed. The lack of vegetation under which it could nest on Manana is still another factor in its absence.

*Red-footed Booby*.—Although this species is not known to nest on Manana, it nests on Moku Manu and, in recent years, has started a large breeding colony on Mokapu Peninsula. The nesting cycle was decidedly irregular on Moku Manu, for eggs were found in January, February, April, June, October, and November. Young in different stages were also found throughout the year. Nevertheless, there were peaks in the extent of nesting with a maximum of 200 nests estimated on February 23, 1947, on Moku Manu. The greatest number of adults and/or flying young estimated to be on the island was 300 in September, 1947. Surprisingly, by October 18, 1947, some 50 new nests had been made, perhaps indicating a second nesting for some individuals. Storms early in 1948 largely destroyed the eggs and young of this species, and renesting was little attempted even by the end of April.

Nests of Red-footed Boobies on Moku Manu were found chiefly on the high east end and on the upper parts of the south slopes. The greatest concentration of nests was found in the fall of 1947 when about 40 nests were located on a high southeast slope in an area about 60 by 150 feet. Brown Booby nests were sometimes near those of the red-footed species on the lower southern slopes. On the top of the islands nests of Red-footed Boobies were sometimes surrounded by nesting Sooty Terns, the terns even being under the edges of the bushes supporting the booby nests. The booby nests when first built consist of a handful of fresh branches, as of *Atriplex*, a foot or two long, bent or placed in a rough circle on top of a low bush. The booby packs these branches down, adds more branches, and bends the living bush down with its weight so that a rather flat, nesting platform results.

Breeding of Red-footed Boobies on Mokapu Peninsula seemed roughly to parallel that on nearby Moku Manu and did not suggest overflow from one colony to the other. Still, crowded conditions and limited nesting bushes on Moku Manu may partly explain the "need" for the peninsular colony. It is possible, too, that severe persecution



of boobies by the many Frigate Birds on Moku Manu has been an added reason for establishing a new colony. For some reason the Frigates rarely harry the peninsular birds and do not spend much time on the steep cliffs of the peninsula. The peninsular colony was larger, with estimates of some 500 birds present in April and May, 1947, and again on December 14 of that year. Eggs were again found over much of the year. The fact that no boobies of this species nested on Manana may be explained by the lack of bushes of sufficient size on which to build nest platforms. The colony on Mokapu Peninsula takes advantage of suitable nesting bushes and kiawe trees even though molestation of nesting, as by people and predatory mammals, must be much more frequent than it would be on Manana.

*Brown Booby*.—Adults or flying young of this species were seen on all visits to Moku Manu. However, the number seen varied considerably and the breeding season was somewhat better defined than that of the Red-footed Booby. In both years of observation, nesting first reached its peak in January or February with as many as 75 nests counted on February 23, 1947. Partly grown young present at this date indicated that some laying must have started in December, 1946. Some young were flying by the end of July, 1947, although a few eggs were still being incubated at the end of that month. Very few young were unable to fly by the end of September, 1947. A minimal number of adults or flying young were seen on the island in October and November (24 estimated in October, 1947). This apparently fairly regular cycle was upset in 1948 when the destruction of many nests by January storms made renesting necessary for most boobies. Some 60 adult Brown Boobies, mostly nesting, were estimated as present on January 11, 1948. On February 28, though, only 20 birds and five nests were counted. On April 24, 22 nests with eggs were found.

The nest sites of this booby were rather generally scattered over the lower south-facing slopes of the island, but one gully on the north, top slope had a group of about 20 nests in 1947. This group was next to the perching site of some 30 Frigate Birds. The main area of concentration of nests during both years of study was on a fairly level, sparsely rocky area just above high tide level on the southeast corner of Moku Manu. Nests were either right on the ground or on very low vegetation. The nest seems to be less important to these boobies than to the red-footed species, for most often almost no real nest is present and, even when some sticks are used, a fairly solid platform elevated on a bush is not made. Two eggs were the rule for this species but three were once recorded. We have no certain record of two young being raised to maturity. In 1947, two small young were

sometimes seen in the same nest but two young as much as half-grown were never seen in a single nest.

The greater regularity of the breeding cycle of this species, compared to the Red-footed Booby, is noteworthy. Both species tend to have about the same peak of laying activity early in the year, but much more variation after that was exhibited by the latter species. It is not clear why the Brown Booby does not nest on Manana or the peninsula. It does not normally utilize bushes in building its nest, and there would seem to be more suitable nesting space on Manana than on Moku Manu. Molestation by man may be the important factor, even though boobies are subject to much predation by Frigate Birds on Moku Manu. However, the population on Moku Manu is small and there is no crowding in the colony, as judged by human interpretation.

*Gray-backed Tern.*—This tern bred in small numbers each of the two years of observation on Moku Manu but was recorded only as a visitor on Manana. On May 10, 1947, about 30 adults and three young were seen on the lower middle south slope of Moku Manu. Only six adults of this species were found from January through April in 1948. They were in the same local region of the island as before. At least three young were successfully hatched in spite of adverse weather conditions early in that year. One nest found on February 28, 1948, was well back under large rocks. This may explain the successful raising of young even though all the Sooty Tern nests which had surrounded the nesting area of the Gray-backed Terns were destroyed by storms. These records, although for few individuals, indicate a regular breeding cycle with the species not present in the fall. This species was noticeably more wary than the other terns, and it seems understandable that it has not attempted to nest on less isolated Manana.

*Mynah.*—The Mynah has been observed in most months of the year and in numbers up to 30, on Manana, but only once on Moku Manu. This may be explained by the fact that Moku Manu is farther from suitable Mynah habitat on Oahu than is Manana Island. None was seen on Manana in July, August, September, and December, but no trips were made in July and only one in each of these other months. A nest was found on Manana but no eggs or young were observed. Northwood (1940: 35) recorded a Mynah nest with three young on Manana in June, 1939. Tern eggs that had probably been eaten by Mynahs were found on both islands, but no direct observation of predation was recorded. On April 19, 1947, on Moku Manu, a freshly opened Sooty Tern egg was found in an area from which several Mynahs had just been frightened. Many pecked eggs, each with a hole a few millimeters wide, had been found in this region some two

months before. On April 18, 1947, Breese observed on Manana some 30 broken Noddy Tern eggs, each with a hole in the side about 20 millimeters wide. Groups of Mynahs were seen on the island that day but, again, none were actually seen to peck tern eggs.

*Migrants and Occasional Visitants.*—Such species are listed in Table 2 as to their occurrence on both islands and will not be treated in detail here. The Frigate Bird was perhaps the species of greatest interest to us in this group. Actually, it was constantly present on Moku Manu and had the behavior characteristics of a resident species except that it was not known to nest on the island. Its numbers were at a minimum in January and February (as few as an estimated 120 were seen on February 28, 1948) but built up to a maximum of some 1,000 from May through the fall. Immature birds were seen throughout the year. Inflated gular pouches of the males, presumably a courtship display, were seen as early as January but especially from April through July. Nevertheless, no nests were ever found, even though repeatedly searched for. While it is probably true that Frigates prefer denser and higher vegetation for nesting than that found on Moku Manu, some of the bushes appear adequate, and isolated slopes and ledges are present. However, this is the only factor to which we can attribute the absence of nests. Apparently this species nests on distant islands but is present on Moku Manu only to prey on other birds, principally boobies, nesting there and feeding in the vicinity. Frigates were not seen to alight on Manana, but only to fly over or near it.

The group of Frigates on Moku Manu is probably entirely non-breeding and immature individuals. Development of the gular pouches and other courtship appurtenances occurred here at the same time as on Laysan and Midway where the birds nest in August. There was no apparent decrease in numbers present in the summer months—actually, an increase occurred; hence, it seems unlikely that the Frigates here were migrants or that they would breed during the year.

#### DISCUSSION

The ornithology of Moku Manu and Manana islands off Oahu discloses that some eleven species of birds breed on these islands, ten breeding on Moku Manu and six on Manana. Moku Manu is and has been definitely less disturbed than Manana and the birds on it seem to have reached a relatively stable population as to breeding species, breeding areas, and numbers of birds, although quite variable during the year. The vegetation on Moku Manu contains fewer introduced and more native species. Manana appears to have less

stable conditions as indicated in particular by the recent addition of the Sooty Tern to its list of breeding species. The greater number of introduced plants, the presence of introduced rabbits and mice, and the more frequent visitation by people seem to be associated with fewer breeding species and less stable conditions on Manana.

TABLE 4  
OCCURRENCE OF BREEDING BIRDS ON MOKU MANU AND MANANA ISLANDS

January	February	March	April	May	June	July	August	September	October	November	December	
SPECIES BREEDING ON BOTH ISLANDS												
.....*	o	o	o	o	o	o	o	o	o	o	o	Wedge-tailed Shearwater
.....*	o	o	o	o	o	o	o	o	o	o	o	Bulwer's Petrel
.....*	o	o	o	o	o	o	o	o	o	o	o	Manana
o	o	o	o	o	o	o	o	o	o	o	o	Moku Manu
.....*	o	o	o	o	o	o	o	o	o	o	o	Manana
.....*	o	o	o	o	o	o	o	o	o	o	o	Moku Manu
o	o	o	o	o	o	o	o	o	o	o	o	Hawaiian Tern
o	o	o	o	o	o	o	o	o	o	o	o	
SPECIES BREEDING ON MOKU MANU ONLY												
.....*	o	o	o	o	o	o	o	o	o	o	o	Christmas Island Shearwater
.....*	o	o	o	o	o	o	o	o	o	o	o	Laysan Albatross
o	o	o	o	o	o	o	o	o	o	o	o	Brown Booby
o	o	o	o	o	o	o	o	o	o	o	o	Red-footed Booby
.....*	o	o	o	o	o	o	o	o	o	o	o	Gray-backed Tern

Dashed lines indicate approximate duration of stay on islands. Asterisks indicate beginning of major breeding cycle. O's indicate times of egg-laying.

† is a record for Mokolea Rock.

Table 4 lists the breeding sea birds of the islands and summarizes the usual duration of stay and the time of egg-laying of each species. Inspection of the table shows that seven of the ten species have a northern hemisphere breeding cycle with egg-laying starting in the winter or spring. Two of these same species (the Sooty and Noddy Terns), when on Moku Manu, do not show this type of cycle. These two species and three others, the two boobies and the Hawaiian Tern, either start laying in the fall or early winter or have their times of egg-laying spread over much of the year.

The above variations in breeding cycles cannot be clarified by this study although some explanations are suggested. It will be noted, for one thing, that all the species which are present throughout the year have protracted breeding seasons. This was particularly true with the two boobies and the Hawaiian Tern, species whose populations seem resident and more or less constant throughout the year. It was less true with the Sooty and Noddy Terns on Moku Manu for, although these terns were present here over the whole year, their

populations varied greatly, and the times of egg-laying, even though prolonged, showed definite starting peaks.

It would appear that the resident breeding sea birds have lost or tended to lose a northern hemisphere cycle, but that the species which are migratory (hence, away from the islands part of the year) have retained such cycles. Photoperiodicity does not appear to be the primary cause because most of the migratory species studied here go to regions which are nearer the equator and have even less fluctuation in length of daylight than does Hawaii. The contrasting cycles of Sooty and Noddy Terns on Manana and Moku Manu may indicate that migratory and resident populations are involved. Presumably, these two terns on Manana are migratory, although almost nothing is known of the movement of these rather cosmopolitan tropical species (Murphy, 1936: 1152). These terns on Moku Manu may well migrate, but in a less regular fashion, with some of the birds breeding at different times. The lack of sufficient suitable nesting space might, in the case of the Sooty Terns, lead to populations with irregular breeding cycles. This would not seem to be likely, though, with the less numerous Noddy. Breeding cycles are known to become less regular, on a yearly seasonal basis in particular, as one nears equatorial regions. Murphy (1936: 1125 and 1154) pointed out that Noddy and Sooty Terns breeding near South and North America are definitely migratory on a seasonal basis in the northern and southern parts of their range, but are irregular in the tropics. Sooty Terns in the Dry Tortugas (24° N. Lat.) begin laying in May while laying becomes earlier and less regular toward the equator.

The two islets of this study appear to be comparable to islands of similar latitude in both the North and South Atlantic. Such islands seem to be near a borderline where seasonal periodicity has been preserved in some species but is being or has been lost in others. In equatorial regions, wet and dry periods, with breeding starting after the wet season, may over-ride seasonal cycles. Murphy (1936: 123) found this to be true with most sea birds of the Caribbean coast of South America, at about 12° N. latitude. In the Hawaiian region the most severe storms and somewhat greater rainfall seem to be in the late fall and early winter. This may be a factor with the several species that start breeding after this time. It definitely is not a factor with such species as the Sooty Tern on Moku Manu, which may start breeding during the most inclement weather.

One cannot disregard the possibility that the breeding populations of Sooty and Noddy Terns now present on each of these two islands are made up of stocks from two or more different colonies which may

have been on different cycles. The small breeding population of Noddies on Moku Manu and of Sooties on Manana Island may represent new "pioneers" from islands of far different latitude, and their cycles may be indicative of their former home, not their present breeding grounds.

It is to be hoped that further study of Hawaiian sea birds can help answer the questions raised by this investigation. An extensive banding program could yield very interesting information on several points. Perhaps more important would be a study for which the observer could stay on the islands, especially Moku Manu, for a period of several months, particularly during the fall and winter when the picture of bird populations and breeding activities can change so rapidly.

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FRANK MICHLER CHAPMAN, 1864-1945

BY ROBERT CUSHMAN MURPHY

NEITHER passage of time nor growth in the number of ornithologists can ever deprive Frank M. Chapman of his unique niche. It is statistically conceivable that the main characteristics of his temperament, tastes, and abilities might again find combination in a single individual. But the period in which he lived can never return, and a human product is the result of a lifelong chain of interaction between personality and environment.

Some men seem destined to fulfillment in only one field, and lucky are they who find it. Chapman, because of his well-rounded mind and his gift of effective concentration, would probably have succeeded in almost any. The late Dr. T. Gilbert Pearson once expressed the matter, tersely even if inelegantly, by saying: "Throw him penniless on Broadway, and in ten years he would own both sides of the street." Besides being sensitively attuned to nature, music, poetry, and the graphic arts, Dr. Chapman was, indeed, an extremely astute business man, and a writer whose flair for journalism is revealed by penetrating editorials in practically every issue of *'Bird-Lore'* throughout several decades. He was also a man of the world, in the best sense of that term, and one who with complete composure could express himself tactfully and forcefully in any company and in the face of any audience. Few who knew him only in latter life, after the delicate balance of his health had made him wary and even subdued, could realize the extent of his native bodily vigor, his skill in games, and his keenly competitive zest for sports. In school days, he has stated, he was never passed in a foot race, and his coach promised him the accolade of becoming a ten-second man if he would carry into college his fervor for the hundred-yard dash.

Chapman also had a rare talent for friendship, although it must be admitted that he chose his intimates with excessive eclecticism. He could be winning and charming to a quite exceptional degree, and yet the fact that he might receive and enlighten a chance inquirer with utmost courtesy and helpfulness was no assurance that he would as freely open the curtains of his spirit under other circumstances.

There was something suggestively Latin in that trait of Dr. Chapman's, even though it was derived from North European germplasm. Those of us who have shared some of his familiarity with Hispanic Americans know how very well acquainted it is possible to become with our friends in the republics to the south without learning anything

whatsoever about their families. But this fact has the great compensation that, if and when you are honored by being admitted to the home, you achieve at once a peculiarly favored standing with the members of all generations.

So it was in a sense with Dr. Chapman. Associates in various walks of life knew him for years as a pleasant, somewhat grave and reserved neighbor or colleague, without really knowing him at all. When, however, of his own volition he led one across the threshold of his confidence, all earlier hint of aloofness disappeared, and the relationship thus established was not likely to be interrupted. It is fortunate that most of the younger ornithologists whom Dr. Chapman attracted to the Department of Birds in the American Museum of Natural History—the center and focus of his whole being for more than half a century—sooner or later felt and accepted the wordless invitation.

The temperament here but feebly reflected may suggest a trace of introversion. This is perhaps a just conclusion, for Chapman harbored strong and not always well-founded prejudices, mostly concerning matters of no great significance. Many a man who had earned the high regard in which he was generally held seemed to have been entered, nevertheless, in Chapman's private *Index Expurgatorius*. It may be that the unconscious offender had had the misfortune, perhaps for the only time in his life, of putting the wrong foot forward while Chapman's critical eye was on him. "The Chief," as some of us called him in the Department of Birds, was fully aware of his own foibles. He would even smile assent when he was told that his approval of a man was a valued endorsement but that his disapproval often meant nothing at all. "I know it," he would usually reply, but without any urge to analyze, reconsider, and reconstruct his impression.

Another side of the same quirk in his make-up was shown by his occasional overestimation of the competence, if not the character, of men and women of whom he was fond. In short, it would not be unfair to state that in personal relations Dr. Chapman's judgment and emotions inclined to jump into the same pan of the scales. To the friends he had chosen, he was loyal. If they were younger associates, he had an unfailingly warm and generous interest in them, their families, finances, and everything else that concerned their welfare. The fact that they were his friends was an almost too-sufficient basis for approval and harmony.

This attitude was restricted, however, to the personal rather than the scientific realm of ideas. Many of us recall an A. O. U. meeting at Cambridge, Massachusetts, during which at least two of the junior ornithologists of Dr. Chapman's own staff, in a discussion of an



*W. M. Chapman*



evolutionary problem, very determinedly took a point of view quite at variance with his own. Chapman defended his thesis two-fistedly but he was obviously delighted at the source of the opposition, and he ended by drawing a moral from the independent thinking and lack of regimentation in the Bird Department over which he presided.

Still another inclination that might be considered a weakness in Dr. Chapman's disposition stemmed from the very affection in which he held his younger co-workers, and expressed itself in a somewhat old-fashioned paternalism that was now and then likely to be taken as an interference with individual freedom of choice. A youth who was a key worker in his great ornithological campaigns in South America might, for example, marry and still wish to continue in the same career, but Dr. Chapman's own sense of responsibility as to the risks permissible to one who had taken a bride was so definite, and even so obdurate, that it sometimes proved impossible to work out a *modus operandi*.

Dr. Chapman was always a fundamentally shy individual, despite his assurance before an audience. Physically, he was just under average stature, but well formed, perfectly erect, and sprightly in movement. He had a pronounced habit of rising to his toes when speaking from a platform. He always retained a good proportion of his teeth and his light brown hair, baldness not progressing beyond the "high forehead" stage. His eyes were hazel, with a certain concentration of pigment into fine spots in the iris. They could be equally expressive in kindness and in an almost beady aloofness. He wore an unruly—one might say gnarled—moustache. His voice was well modulated and pleasing. His political leanings were mainly conservative, although he left the traditional Republican fold to follow his admired friend, Theodore Roosevelt. He was a frank Anglophile, and there have been those who accused him of consciously adopting a British intonation, but it is interesting that his English friends thought of him as speaking excellent "American." He had plenty of iron in his essentially gentle nature, as indicated by countless instances of self-control. When he discovered in his thirties, for example, that smoking and inhaling from 60 to 80 black Cuban cigarettes a day was lowering his efficiency, he gave up tobacco abruptly and permanently. To the end of his life he enjoyed wines—always sweet—and, to the horror of his family and other intimates, *sweet* cocktails. He also consumed an inordinate quantity of ice-water with his meals.

As might be inferred, Dr. Chapman was a man of restrained and seemly speech. His son tells us, nevertheless, how he once demonstrated that his tongue was normally bridled by choice rather than by

innocence. This was in Peru in 1916. His party had left Cuzco for a month's field work in the Urubamba Valley. Awakening in camp on the second morning, the leader discovered that the muleteer and all six pack animals had vanished. "When Pop found his outfit immobile," writes Frank Chapman, Jr., "he emitted a string of oaths of which any sergeant of Marines might have been supremely proud." The testimony is well qualified because it comes from a witness who rose from the ranks to a major's commission in the United States Marine Corps!

Few men enjoy as full a biographical record as Frank M. Chapman. In 1933, he published his own "Autobiography of a Bird-Lover," a substantial volume of 420 pages. This was followed by two other books from his pen that carried the story still nearer the end. Since his death, he has been the subject of a dozen or more memorial accounts, and still others are known to be in preparation. At least one of the memorials, namely that issued by the National Academy of Sciences, contains a practically complete bibliography of Chapman's publications, which comprise 17 books and some 225 articles in periodicals. In view of such readily available data, we may avoid repetition of the details of his scientific output, and at the same time limit other "vital statistics" to a minimum. The accomplishments of a man of science remain indefinitely accessible to those who need or wish to dig them out. Many characteristics of personality, on the other hand, must be set down by contemporaries.

The principal published accounts are:

- J. P. Chapin, 1945. Frank Michler Chapman. *Explorer's Journal*, 23: 8-9.  
W. K. Gregory, 1948. Biographical memoir of Frank M. Chapman. *Nat. Acad. Sciences Biog. Memoirs*, 25: 111-145, portrait.  
Ludlow Griscom, 1946. Frank Michler Chapman. *Audubon Magazine*, 48: 49-52, portrait.  
R. C. Murphy, 1945. Frank Michler Chapman. *Year Book American Philosophical Society*, pp. 354-361.  
R. C. Murphy, Guy Emerson, Elsie M. B. Naumburg, and John Kieran, 1946. An assemblage of friends pays tribute to Frank Michler Chapman. *Audubon Magazine*, 48: 179-182, portrait.  
R. C. Murphy, 1949. The first fifty years. *Audubon Magazine*, 51: 2-5. (While not primarily biographical, this article tells the story of Dr. Chapman's career as educator, conservationist, and founder of 'Bird-Lore'.)  
R. C. Murphy, 1949. Frank Michler Chapman. *El Hornero* (Buenos Aires), 9: 113-117, portrait.  
Moriz Sassi, 1947. Dr. Frank M. Chapman. *Annalen Naturhistor. Museums in Wien*, 55: 207-209.  
J. T. Zimmer, 1946. Frank Michler Chapman. *Science*, 104: 152-153.  
J. T. Zimmer, 1946. Frank Michler Chapman. *American Naturalist*, 80: 476-481, portrait.



Published during Dr. Chapman's life, and in whimsical vein, is the following, which has biographical interest.

G. T. Hellman, 1939. Profiles: Boy Meets Bullfinch. *New Yorker*, March 11: 22-27, sketch portrait.

Frank M. Chapman was born in a country residence of charm and dignity in what is now West Englewood, New Jersey, on June 12, 1864. His father, Lebbeus Chapman, Jr., was a member of a New York law firm. His mother, Mary Augusta Parkhurst, was a "born musician," with a pronounced love of nature that expressed itself particularly in the care of a garden. The families of both parents had been in America since early colonial days and Chapman's ancestry so far as he knew, was English on both sides "except for one lone Irishman."

Chapman's musical inheritance is worthy of further brief comment. His son, a gifted singer, and his daughter-in-law, who is Miss Gladys Swarthout, of the Metropolitan Opera Company, regarded him as an almost infallible critic and commentator. He never pulled his punches when evaluating a performance; he had an incredible ear for tone and seemingly flawless judgment regarding music, old or new, that he had never before heard.

As a boy, Chapman attended the Englewood Academy and, when graduated in 1880 at the age of 16, he chose not to go to college and took a position in the American Exchange National Bank of New York, of which his father had been counsel until his death four years earlier. The story of his banking servitude for six years has been told in his autobiography. Throughout this period he used his leisure for the observation of birds and gradually made contacts with many of the relatively small number of amateur and professional ornithologists of those days. The influence that finally determined the great break in his life came from the late Dr. A. K. Fisher, whom he always called his "ornithological godfather." In 1886 he resigned from the bank, much to the mystification of his associates. Using modest financial resources inherited from his father, he next laid the foundation of his subsequent career by field work in then unspoiled Florida.

In 1888, he was appointed assistant to the late Dr. J. A. Allen in the American Museum of Natural History, at a salary of fifty dollars a month. Ten years later, at the age of 34, he married Fanny Bates Embury, immediately thereafter taking her on a collecting trip in Florida. Later, they carried on in the field together in the Gulf of St. Lawrence, the Bahama Islands, and elsewhere. Of Mrs. Chapman, who died about a year before him, he once wrote that "she made it the chief object of her life to advance the aims of mine." They had one child, a son, born in 1900.

In 1901, Chapman was promoted to the rank of Associate Curator in Dr. Allen's department of mammals and birds, and in 1908 he became Curator of Birds. In 1920, a separate department of birds was established, of which he was named Chairman, remaining at the helm until his retirement on June 30, 1942, at which date he had served the American Museum continuously for 54 years. Thereafter, he spent most of his time in Florida but came north to Nantucket for the summer of his 82d year, and died in New York on November 15, 1945.

Dr. Chapman's competence covered many fields, all of which have received recognition at considerable length from one or another of his biographers. He was a creative museum-builder, a life-long conservationist, a taxonomist and biogeographer, a student of bird behavior, and always an educator. His experience as an explorer, combined with his knowledge of Spanish and his diplomatic flair, admirably fitted him, while serving as Director of Publications of the American Red Cross, during the first World War, to be a special commissioner of the Red Cross in Latin America.

As a writer and lecturer, he won early the reputation of being the most articulate ornithologist of his generation. Because he was as much concerned with the habits and protection of living birds as with their classification and relationships, he exerted wide influence in creating popular interest. He was an outstanding member of the group of pioneer American naturalists responsible for what has sometimes been called "the discovery of the out-of-doors."

From his first sight of a Cardinal on a Georgia farm, as a lad of eight years, he maintained a life-long passion for birds which represented a rare blend of esthetic appreciation and scientific understanding. He said that birds were Nature's most eloquent expression of beauty, joy and freedom. Such a precept served a great purpose in inspiring children as well as adults to observe and record during a plume-hunting and cage-bird period, when need for protection by law and public sentiment was of critical importance.

Dr. Chapman always remained "young" and receptive to new ideas in ornithology, even into advanced age. He was himself a leader in so many branches of his expanding science, and he had such sympathy with even the humblest of his fellow-workers, that his encouragement of others and his educational example were unprecedented. As Lord Gray of Fallodon once said of him: "he is one . . . in whom knowledge quickens feeling, and that quickening of feeling gives a special gift of imparting the knowledge which he acquires to others."

Most important, probably, among Dr. Chapman's publications were his 'Handbook of Birds of Eastern North America' (1895, and subse-

quent editions) and the culminating reports on his prolonged studies in South America. These were 'The Distribution of Bird Life in Colombia' (1917) and 'The Distribution of Bird Life in Ecuador' (1926). He referred to the biota of the Andes as "a recent annex to the world." His problem was to ascertain the effects upon the distribution and evolution of birds that had been produced by the uplift in recent geologic time (and later modified by erosion and subsidence) of a vast mountain system with its central base near the equator, its summit reaching perpetual snow, and its wings extending continuously into the temperate zone. He presented not merely a faunal summary of his findings but also a geographical and ecological analysis, thus extending to South America the life-zone concept of North American naturalists. It is indicative of the intensive activity of Dr. Chapman that the Ecuador volume of nearly 800 pages is based upon the study of more than 13,000 specimens of birds from that Republic, as well as upon months of personal exploration covering thousands of miles of difficult terrain.

Among Dr. Chapman's distributional discussions, the most interesting to both biologists and geographers is perhaps that relating to discontinuous ranges of birds. Such distribution can not be explained by the absence of suitable intervening habitats, because in countless instances the latter now appear to exist. Rather, discontinuous distribution proves or strongly indicates effective barriers in former times, which restricted the representatives of numerous species to the limited and segregated ranges that they now occupy. Chapman dismisses the idea that the phenomenon of discontinuity is due merely to the bird's potential mobility and holds that, on the contrary, this very circumstance makes birds especially valuable indices of the forces that have produced faunal areas. He maintains that the casual establishment of isolated bird colonies is infrequent, and cites the fact that whole families, comprising about two hundred species that are common on the mainland from Guiana to Mexico, are yet totally lacking in the West Indies. Climatic changes due to glaciation and volcanic activity, which at some period may have exterminated the bird life of large areas, are offered as probable but at best only partial explanations.

In his latter years, Dr. Chapman spent several winters at Barro Colorado Island in the Panama Canal Zone, where he wrote his last two books and made the observations and experiments for a number of scientific papers. It was here that he worked out the life histories of Wagler's Oropendola and Gould's Manakin. In the report upon the latter, he employed new techniques of bird study, indicating the flexibility of his mind at the age of seventy years. Still later (1940),

his revision of the numerous races of a single species of South American Sparrow, 'The Post-glacial History of *Zonotrichia capensis*,' serves in its approach and organization as a model for any present-day ornithologist.

Scientific recognition of Dr. Chapman included honorary membership in many learned societies. He was elected to the American Philosophical Society in 1921, and to the National Academy of Sciences the same year. Other honors included the award of the first medal of the Linnaean Society of New York, the first Elliot medal of the National Academy of Sciences, the Brewster Medal of the American Ornithologists' Union, and the medals of the John Burroughs and Theodore Roosevelt memorial associations. In 1913, Brown University conferred upon him the degree of Doctor of Science. He was an honorary member of the British Ornithologists' Union, the Deutsche Ornithologische Gesellschaft, the Club van Nederlandsche Vogelkundigen, the Sociedad Ornitológica del Plata, and the New York Zoological Society; a Fellow and Past-President of the American Ornithologists' Union, Past-President of the Linnaean Society of New York, and one-time Assistant Editor of 'The Auk.'

Five months after Dr. Chapman's death, on April 24, 1946, a memorial meeting was held at the American Museum of Natural History. The large hall was filled with his friends and colleagues and with admirers from all walks of life. Those who made brief but memorable addresses represented various relationships of his career. They comprised Dr. Leonard C. Sanford for the Trustees of the Museum, Mr. Guy Emerson for the National Audubon Society, Mrs. Elsie M. B. Naumburg for Dr. Chapman's own staff, Mr. John Kieran for amateur naturalists in general, Dr. Herbert J. Spinden for explorers, Lieutenant Commander Peter Scott, R.N.R., for the painters of birds and for ornithologists across the sea, and the Honorable Frederick C. Walcott, former United States Senator from Connecticut, who spoke as a fellow-worker with Dr. Chapman in the wilds of Magellanic South America. To close the meeting, which none then present will forget, Dr. Chapman's daughter-in-law, Gladys Swarthout, sang the Lord's Prayer, set to the music of Malotte.

The spirit of that assembly was expressed in words of the presiding chairman:

"However much we mourn the loss of Dr. Chapman, this is not to be regarded as a sad occasion. I recall very well the memorial meeting for Louis Agassiz Fuertes, whose death, due to accident, was as severe a blow as Dr. Chapman was ever called upon to sustain. Yet the great heart, the cheerfulness, the whimsicality and irrepressible sense

of humor so characteristic of Fuertes broke through the sorrow of his comrades who had assembled to think and speak of him. The joy and fun with which he bubbled in life survived to rob the occasion of some of its tragedy. Dr. Chapman always remembered that day as a most exalting experience.

"If Fuertes, whose life ended in middle age, could spread such a benison over the host of friends who had come together to honor his memory, surely Dr. Chapman, who lived happily and constructively to the age of 81, carrying out his research and his writings to within about six weeks of the end of his life, should leave us the same kind of memory. Therefore, I hope that I reflect the sentiments of everybody here today when I state that this is not a sad gathering but is, on the contrary, a triumphant assemblage of Dr. Chapman's friends, proud of their relationship with him, eager to emulate his example as a man and a naturalist, and determined to do all possible to further the love and understanding, and beneficent use, of the outdoor world, all of which he encouraged to perhaps a greater degree than any other man of his generation."

*American Museum of Natural History, New York, January 6, 1950.*

REPORT OF THE A. O. U. COMMITTEE ON BIRD  
PROTECTION, 1949

IN reviewing the progress or lack of progress in bird protection during 1949, it is obvious that several major events have occurred.

*Duck Stamp Amendment.*—Perhaps the outstanding single favorable occurrence has been the amendment of the Duck Stamp Act., increasing the price of stamps to two dollars. This will permit resumption of refuge development and should help fill the serious gaps that still exist in the refuge system. The amendment also provides for eventual development of limited portions of newly acquired lands as public hunting areas and should help acquire refuges in areas in which it has been difficult. Safeguards written into the bill outline conditions under which lands may be opened to shooting and appear adequate to protect this provision from abuse.

*Public Opposition to Development Projects.*—A second encouraging development is the growing opposition to legislative proposals which purport to extend economic development by sacrificing important natural resources. Opposition to ill-planned impoundments, drainage ventures, and oil and gas exploitation schemes was in several instances successful in stopping the proposed projects or in securing modification of preliminary plans to insure protection of wildlife and natural resources.

The withdrawal of the Glacier View Dam which would have flooded part of Glacier Park and the abandonment of the Kanab Creek diversion which would have adversely affected Grand Canyon National Park are examples of such success. On the other hand, conservation forces lost one round of the battle to preserve 11,000 acres of marsh just north of the U. S.-Canadian boundary, when the International Joint Commission approved a reclamation scheme. The battle will be continued in British Columbia.

*Public Support for Wildlife Research.*—An additional indication of public demand for more fundamental information to help safeguard its resources was manifest in expansion of the Cooperative Wildlife Research Unit program sponsored jointly by the state college or university, the state conservation department, the Fish and Wildlife Service, and the Wildlife Management Institute.

As of March, 1949, Units were operating at 14 land-grant colleges in Alabama, Colorado, Idaho, Iowa, Maine, Massachusetts, Missouri, Ohio, Oklahoma, Oregon, Pennsylvania, Texas, Utah, and Virginia. The Colorado, Idaho, Massachusetts, and Oklahoma Units have been established since 1947, while the first ten units have been in existence



since 1935-1936. Legislative appropriations sponsored by state conservation departments and colleges for the establishment of three of five new units in Arizona, Montana, North Carolina, New York, and Alaska were approved.

Numerous outstanding accomplishments have been achieved by the Units. Probably the most significant value is that the program provided trained men to fill important wildlife positions created by the Federal Aid in Wildlife Restoration (Pittman-Robertson) Act of 1937. By the end of the 1947-48 school year, "Unit Graduates" numbered 773. Unit findings have been applied by the state game departments in conducting game censuses, establishing and modifying game laws, selecting and creating game refuges, and in developing habitat improvement projects.

*Migratory Birds.*—The continued improvement in the machinery for estimating current populations of migratory game birds is worthy of comment. The Fish and Wildlife Service, the Dominion Wildlife Service, the state game departments of several north-central states, and the game branches of the provincial governments in the prairie provinces are all cooperating closely. By the use of airplane census strips, as well as by censusing from automobiles and canoes, the coverage has been increased to assure reasonable accuracy in population estimates during the breeding season, so that hunting regulations can be based upon a more accurate and up-to-date population survey.

An additional development has been an intensive investigation into waterfowl problems of eastern Canada, an area long neglected in this respect. The investigation is supported by the Wildlife Management Institute with the cooperation of other agencies, and the Black Duck, *Anas rubripes*, has been the main problem of investigation. The same species has been the object of investigation in the northeastern states by the Joint Black Duck Committee which represents the game departments of several of the states, together with the Fish and Wildlife Service, Ducks Unlimited, and the Wildlife Management Institute. An important contribution to waterfowl conservation has been made by the publication by the Wildlife Management Institute of a bulletin entitled 'Waterfowl Management on Small Areas.' This publication places in simple and specific terms the measures which it is feasible for both individuals and public agencies to accomplish in the interests of waterfowl restoration, particularly in the heavily populated northeastern states.

Following the joint program in the northeastern states, the state, federal, and private agencies have formed committees in each major waterfowl flyway composed of research men and field staff members.

These committees are developing uniform methods of censusing, of recording hunters' take, crippling losses, etc., in order that all available data will be directly comparable.

Similar cooperative projects have been developed between agencies dealing with Mourning Doves, *Zenaidura macroura*, and to a less extent with Woodcock, *Philohela minor*. In the case of the latter species, additional observers are needed to secure a more adequate sampling throughout the breeding area. Assistance from any A. O. U. members in a position to conduct Woodcock censuses each spring on permanent, selected census routes is needed and would be very welcome.

The annual winter inventory of migratory waterfowl revealed some increase in the continent's duck and goose populations, although a heavy decline in the Coot population kept the 1949 waterfowl at about the same level as in 1948. Improved breeding-ground conditions, together with stringent hunting regulations and the continued development of wildlife refuges, were considered chiefly responsible. The winter inventory conducted in mid-January from Alaska to Guatemala included the larger West Indies Islands for the second season. About 1300 trained observers using planes, automobiles, and boats participated. In addition to the Fish and Wildlife Service and state conservation department personnel, pilots of the armed forces, and Canadian and Mexican specialists took part. Trends disclosed a 39 per cent increase in the Brant population, a 20 per cent increase in Swans, but a 56 per cent decrease in Coots. Ducks comprised about 75 per cent of the waterfowl noted; Coots, *Fulica americana*, 12 per cent; Geese 10 per cent; Brant less than one per cent; and Swans less than one per cent. Sixty-one per cent of the waterfowl were seen on wintering grounds in the United States; 27 per cent in Central America and Mexico; four per cent in Canada; and less than one per cent in the West Indies. The most significant trends revealed were increases in: Snow Geese, *Chen hyperborea*; Scaup, *Aythya marila* and *A. affinis*; Black Duck, and Mallard, *Anas platyrhynchos*; Scoter, *Melanitta* sp.; and Eider, *Somateria* all forms, populations; and decreases in Shovellers, *Spatula*, and Mergansers, *Mergus* species.

The 1949 migratory waterfowl hunting regulations were liberalized to allow an additional ten days' shooting in each flyway. While drought conditions adversely affect important sections of the breeding grounds in the short-grass prairie regions of Saskatchewan and Alberta, water conditions were favorable throughout the remainder of Canada, northern United States, and Alaska.

Much criticism has been voiced over the slaughter of Band-tailed Pigeons, *Columba fasciata*, for alleged damage to crops in certain con-

centration areas in California. A careful check indicates that much of the criticism was justified. Shooting permits were rather freely issued to complaining ranchers, and blanket permits to allow ranchers to let others shoot brought undoubted abuses. Doubt as to the extent of actual damage has been expressed, and there is little question that the conclusions as to the nature and extent of damage were not based on adequate investigations. The system of handling such cases has been overhauled and some obvious weaknesses eliminated.

*Habitat Improvement.*—The expansion of efforts by state conservation departments to preserve and restore habitats for both upland game and waterfowl is another encouraging development. Practically every state is now devoting some funds to this effort and 33 are making it a major project with Federal Aid funds. While planned primarily for game species, the planting of thickets, hedges, wood lots, strip crops of permanent nature, and the development of farm ponds also provide additional habitat for many other forms of wildlife, including the majority of the birds normally found in the area.

*Introduced Species.*—The drastic widespread decline in pheasant populations, plus success of the Chukar Partridge, *Alectoris*, in establishing itself in Nevada and other western states, has stimulated interest in the introduction of additional exotic game birds. Most biologists, aware of the often disastrous results of successful efforts, question such activities. Efforts are being made to channel all introductions through the Fish and Wildlife Service and secure careful advance information before attempts are made. Dr. Gardiner Bump has been employed as coordinator of this work and this summer has been in Scandinavia studying Black Cock and other game species. If the program outlined is followed carefully, there should be fewer promiscuous introductions, and those that are made should be more intelligently planned.

*Research Programs.*—In addition to those previously mentioned, a number of research studies of interest are underway. An outbreak of botulism on the Tule Lake-Lower Klamath National Wildlife Refuges on the California-Oregon line resulted in a loss of 65,000 ducks in 1948. Similar outbreaks in 1949 in Manitoba and Alberta emphasize the seriousness of this disease in waterfowl management. Experiments in botulism control have been carried on at the Bear River Migratory Bird Refuge, Utah, for many years and the terrific loss which formerly occurred on those marshes has been drastically reduced. These studies need to include additional localities to determine the applicability of present techniques for prevention and treatment of botulism and to develop additional methods of controlling this disease.

Outbreaks of other diseases among the waterfowl offer challenges to research students. An epidemic of fowl cholera occurred again in the Texas panhandle. First observed in the region in 1940, these outbreaks have since occurred each winter. The outbreak in 1948-49, with the loss of at least 2,500 birds, was the most serious so far recorded. On the coast of North Carolina, about 750 Canada Geese, *Branta canadensis*, died from a disease believed at first to have been caused by a blood parasite, *Leucocytozoon*, but later determined by an Agriculture Department parasitologist as probably caused by gizzard worms.

Studies conducted by the Illinois Natural History Survey Field Laboratory at Havana, Illinois, are planned to determine the extent of lead poisoning as a factor in waterfowl loss. More than 500 ducks, domestic and wild, principally Mallards, have been under observation in the experiment. The object is to find ways of reducing losses from lead poisoning contracted by wild ducks which in their feeding pick up lead pellets in heavily shot areas.

*Rare Species.*—Information on the status of rare species continues to be spotty. Changes in conditions over the past year known to the Committee are as follows:

There are no positive records of the Ivory-billed Woodpecker, *Campephilus principalis*, in 1949. Lumbermen engaged in removing the last marketable timber from the Singer Tract reported two in October, 1948. Attempts to verify this report were prevented by high water that made travel in this section of the tract impossible. However, two were seen in Florida on March 3, 1950, by members of an expedition headed by Whitney H. Eastman.

The exact number of surviving Everglade Kites, *Rostrhamus s. plumbeus*, is unknown, but available information is not encouraging. Consideration should be given to the impact on kite habitat of the Water Conservation and Flood Control Plan now being set up in Florida by the Army Engineers. Construction of levees, spillways, and other water control devices are contemplated for the Kissimmee River and Upper St. Johns where these birds may be making a last stand. *Study of the problem is needed.*

The establishment of Everglades National Park should help the Short-tailed Hawk, *Buteo brachyurus*, on the mainland where a few pairs have been seen in recent years. On Key Largo, outside the Park, the post-war land clearing and real estate development threatens to destroy the nesting habitat of the Short-tail and the feeding habitat of the White-crowned Pigeon, *Columba leucocephala*, particularly wild

fig and poison wood trees, the berries of which are important food sources for this pigeon.

There has been no obvious increase of Reddish Egrets, *Dichromassa rufescens*, over a limited range in Florida Bay. These birds are not disturbed and should increase in numbers. It would be helpful to know something of their present status in the Bahamas and West Indies.

During the waterfowl surveys last winter, Harold Peters of the Fish and Wildlife Service counted 6,700 Flamingos, *Phoenicopterus ruber*, in Cuba, Dominican Republic, and the Bahamas. This past spring and summer a survey was conducted under the sponsorship of the Bahamas Government. Dr. Paul Zahl and his associates found the Andros colony abandoned following raids by natives in 1946, 1947, and again in 1948. Some 3,000 birds were found on Inagua where young are being reared, although further commercial developments may in time threaten this group. It is not known if other nesting colonies are present in Cuba or the Dominican Republic. Results obtained at Hialeah suggest that application of the same management techniques would lead to the self-establishment of the species in almost any selected location, including Florida Bay sites.

On the somewhat more cheerful side, the California Condor, *Gymnogyps californianus*, seems to be holding its own. The recent establishment by the U. S. Forest Service of an area in Santa Barbara County from which nearly all human use is excluded should help this bird.

Recent Whooping Crane, *Grus americana*, population figures show improvement, but the total is still dangerously low. The first reliable population estimates were obtained in 1938-39 when there were 18 birds in Texas, 13 in Louisiana, and two captive (total of 33). In the 10-year period that followed, the trend was downward at first but has since picked up. Losses in both Louisiana and Texas flocks dropped totals to five in Louisiana and 15 in Texas (or 22 birds including the two captives) in 1941-42.

The Louisiana flock reduced to one bird was eliminated by the removal of this individual to the Aransas Refuge. In Texas, where most of the surviving birds winter on the Aransas Wildlife Refuge, there has been a slow increase. The Texas population was 30 wild birds and two captives at last count. Thus, at present, the actual gain is averaged at 1.2 birds per year. It is believed that increased protection on the wintering grounds and favorable results from widespread publicity along the migration route are responsible for the present trend. The next few years will tell the story. Attempts have been

made to breed captive birds in a large enclosure in Texas but the initial clutch proved to be infertile. Another pairing is now being encouraged with a different male bird and the experiment will continue. The Canadian nesting grounds have not been located and appear for the present to be completely isolated and presumably safe. However, survival of the species depends entirely on annual production of young (10-year average was 4.5 young annually), and their safe conduct to the Texas wintering ground.

Both the Roseate Spoonbill, *Ajaia ajaja*, and the Great White Heron, *Ardea occidentalis*, show marked increases in Florida. The Spoonbill has responded so well to protection and the changed public attitude that the one Florida Bay colony of a decade ago is now multiplied by ten. Great Whites are probably at a new high in total numbers, a figure close to or exceeding 1,000 individuals. For the first time in recent years, Spoonbills are now fairly common in summer in Florida Bay and along the Keys. Fishing guides and others have learned to point them out as one of the local attractions instead of shooting them. The "No Firearms" regulation for the National Wildlife Refuge in Florida Bay is a big help.

The Trumpeter Swan, *Cygnus buccinator*, population within the United States continued to show a satisfactory increase during 1949. A total of 103 cygnets was raised, a number exceeded only in 1948, when 106 were counted. Twenty-three of these cygnets were produced within Yellowstone National Park, while 80 were hatched on the Red Rock Lakes Migratory Waterfowl Refuge or surrounding lakes and reservoirs. An August, 1949, count revealed 451. It has been estimated that at least 900 Trumpeters are in Alberta, British Columbia, and southeastern Alaska.

A rather severe loss of these swans occurred in connection with the attempted establishment of separate breeding populations on the 175,000 acre Malheur National Wildlife Refuge in southeastern Oregon and, subsequently, on the 35,000 acre Ruby Lake National Wildlife Refuge in eastern Nevada. During the year, 12 birds died from undetermined causes. Specimens, both alive and dead, were examined by a biologist from Oregon State College without detecting symptoms of any of the usual wildfowl diseases. These investigations are continuing.

The 1949 Perry River expedition with Harold C. Hanson and Peter Scott as ornithologists found only one colony of Ross's Geese, *Chen rossii*. Two hundred and sixty nests were counted on five islands, and no breeding occurred on the lakes where they were previously found by Angus Gavin. Ross's Geese were found molting but not nesting in



other nearby areas, but the group concluded that "there are indications therefore that the world stock of Ross's Geese in June 1949 may have been under 2000 birds."

As an added bit of interesting information, Peter Scott and Refuge Manager Vernon Ekdahl counted 460 of these birds on the Sacramento National Wildlife Refuge on November 9, 1948. A later count in January, 1949, revealed that approximately 1400 Ross's Geese were wintering at the Refuge. This is the largest count of Ross's Geese since the Refuge was established.

*General Conditions.*—Conditions for bird life during the past year were generally favorable, although Nebraska, parts of the Dakotas, Idaho, Wyoming, Utah, and Nevada received some of the heaviest snows and the most prolonged blizzard conditions in many years. Reported wildlife losses were not severe except on Pheasants through the Dakotas and scattered deer and antelope herds; human beings and livestock seemingly suffered most during the severe winter.

Attention has been called to the serious decline of birds of prey in the great plains, apparently due to promiscuous shooting by hunters and also to the reduced status of the Duck Hawk, *Falco peregrinus*, in several localities. Obviously more intensive educational work is needed to meet these problems.

During the summer of 1949, drought conditions prevailed over some of the western states with numerous outbreaks of fire.

Congressional action in eliminating appropriations for use by the Forest Service in wildlife management has curtailed important work on forest areas, particularly in the West. These forest areas shelter over 25 per cent of the nation's big game animals and the benefits to bird life are undoubtedly equally important.

*Agricultural Sprays.*—Attention should be called to developments in agricultural sprays which may produce serious effects on bird life. The use of DDT as an insect destroyer has continued on an ever-increasing scale. A number of limited studies have been made on its effect but no one can state accurately the harm which may result to birds and other wildlife from over-use.

In March, 1949, the National Audubon Society issued a press release which cautioned against the indiscriminate use of insecticides:

"Far too little attention has been paid to repeated warnings by the U. S. Fish and Wildlife Service and the Department of Agriculture on the danger of employing certain new insecticides in heavy concentration in outdoor areas. With the expanding use of such poisons, increasingly serious damage can be expected unless great care is taken in dusting and spraying. These new insecticides include DDT, DDD, TEPP, and Chlorinated camphene.

"These toxic agents in heavy applications not only kill birds and fish, but lead to heavy destruction of bees and other insects valued by farmers and fruit-growers. Land fertility may also be affected. It concerns human welfare as well as wildlife.

"Surveys and experiments conducted by the U. S. Fish and Wildlife Service have demonstrated in what concentrations DDT may safely be used. Other organics have not yet been fully tested. Some of them are more deadly than DDT to warm-blooded animals. Wildlife mortality has been cited by scores of observers after checking the results of local insecticide spraying and dusting. Such evidence confirms the hazards of drenching outdoor areas with the new insecticides."

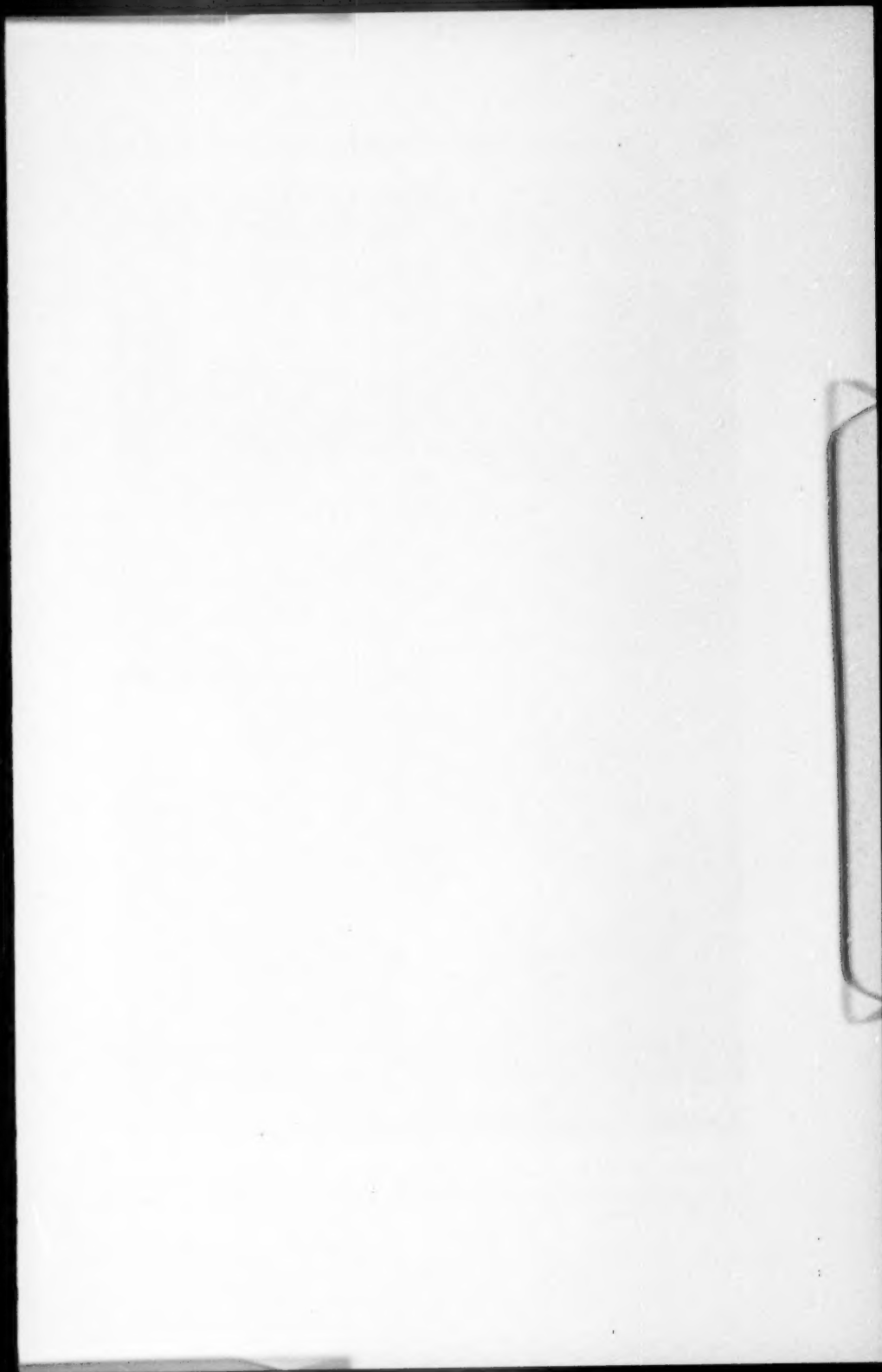
The development of 2-4,D and other potent weed killers and general herbicides poses a threat to bird life which may be even greater than that caused by over-use of insecticides. Such sprays can be used to destroy much of the vegetation which affords food and cover for many forms of wildlife. For example, airplane spraying has been started in western Oklahoma to destroy the oak shinnery, last-stand habitat of the Lesser Prairie Chicken, *Tympanuchus pallidicinctus*. The New Mexico Game Department has bought thousands of acres of similar land and carried on a fine job of habitat restoration for the benefit of this same bird.

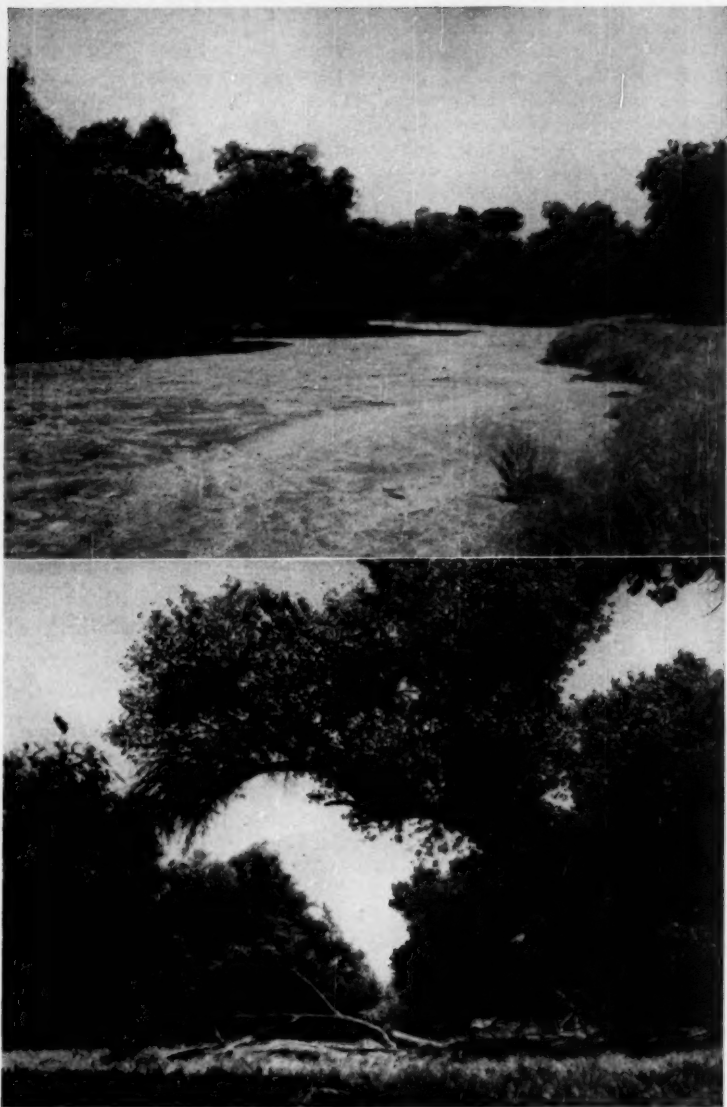
Oklahoma cattle ranchers are, with the encouragement of agricultural agencies, attempting to destroy existing habitat in the hope that it will be replaced by grass. Much of this land is light, sandy loam which is much more apt to develop into active dunes and blow-holes than pasture lands, if the existing vegetation is removed.

These herbicides are also being used against such plant pests as water hyacinth and alligator weed with more success than other controls; so there may be a beneficial as well as an injurious aspect to this development.

The uncontrolled use of both types of sprays may develop into serious local threats to bird life and should be carefully watched by all those interested in birds.

IRA N. GABRIELSON, *Chairman*  
ROBERT P. ALLEN  
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PHILIP A. DuMONT  
RICHARD H. POUGH  
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(Upper) DRY SANDY CREEK BED LINED WITH WILLOWS AND TALL GRASSES, SAN JOAQUIN VALLEY, CALIF. (Lower) OPEN SPACE IN WOODS SHOWING HEAVY GROWTH OF GRASSES.

## NESTING BIRDS OF THE WILLOW-COTTONWOOD COMMUNITY IN CALIFORNIA

BY LLOYD G. INGLES

THE location of this study area is along Dry Creek immediately east of the Kern-Friant Canal, northeast of Clovis in the eastern San Joaquin Valley, California. According to Munz and Keck (1949) it lies within the Valley Grassland Community of the Californian Biotic Province.

The purpose of the investigation was to make a quantitative study of birds on the area in the 1949 nesting season. As far as is known, no such study has been made of this community in western United States. The original nature of biotic communities is rapidly changing in this part of California because greater areas are undergoing irrigation and because of the rapid increase in rural population. It therefore seems desirable to survey the relatively undisturbed natural areas while they still exist, especially in regions where change in the immediate future is imminent.

Thirty-three acres of woodland lying on both sides of Dry Creek and having an elevation between 450 and 475 feet were selected for the study. The woods are composed of but three kinds of trees, practically all over six inches in diameter. A count of all of the trees gave: 787 willows, *Salix sp.*; 170 Fremont Cottonwoods, *Populus fremonti*; and five valley oaks, *Quercus lobata*. The oaks ranged from two to eight feet in diameter and up to 110 feet high. The cottonwoods ranged from six inches to five feet in diameter and up to 90 feet high. The willows ranged up to two feet in diameter and 30 feet in height. The area is less than 200 yards wide and is bisected its entire length (about 0.6 mile) by the meandering sandy stream bed which averages about 50 feet wide (Plate 10). The stream carries various amounts of water in the winter months, but dries entirely by the middle of May. The area has never been flooded in the past 13 years. The only permanent water on the tract is provided by the overflow from a cattle trough at the extreme eastern end. The area is bordered on both sides by the Valley Grassland Community on which native grasses have largely been replaced by: foxtail, *Hordeum murinum*; rip-gut grass, *Bromus rigidus*; and Bermuda grass, *Cynodon dactylon*. Among the trees there are many open irregular spaces which are covered with tall grasses (Plate 10). These spaces, the sinuose stream bed with its 1.4 miles of edge, and the 1.6 miles of perimeter of the tract effectively make this area a "forest edge" or

"forest-grassland ecotone" type (Kendeigh, 1944). All of the species nesting here use both the woods and the open areas and thus fit the definition of a "forest edge" species (Johnston, 1947). Suggestions by Hickey (1943) and Kendeigh (1944) for making a population study were followed. The area was visited every Friday morning beginning at daylight between February 1 and July 1, 1949. Three to eight hours were spent during each visit, making a total of 107 hours. During May and June there were two observers using seven-power binoculars. Procedure was to walk slowly along an irregular route in the woods on one side of the stream bed and return on the other. All birds observed were recorded. Those indicating breeding activity and all nests were recorded with respect to some landmark. No attempt was made to map the areas of various territories.

Within the study tract, grasses grew lush and remained green fully six weeks longer (until the middle of June) than the same species growing on the surrounding open grassland. The open spaces and edges of the woods thus not only provided better cover for ground-nesting species but also more insects and seeds for food than adjacent areas.

Besides the birds of prey, other predators were known to occur on the area. There were frequently signs of: opossums, *Didelphis virginiana*; raccoons, *Procyon lotor*; and coyotes, *Canis latrans*; striped skunks, *Mephitis mephitis*, were often seen hunting in the deep grass. A survey showed from 12 to 20 pocket gophers, *Thomomys bottae*, per acre in the spring and fall, respectively, on the surrounding grassland. Lizards, *Sceloporus occidentalis*, were plentiful on the fallen trees. No snakes were observed. The entire area is pastured each spring.

The author is greatly indebted to Mr. Robert Winter and Dr. Francis Wiley for valuable assistance in the field work.

#### OBSERVATIONS ON NESTING

Twenty species are known to have nested within the study area. The following list gives the species in order of abundance of nesting pairs.

Brewer's Blackbird, <i>Euphagus cyanocephalus</i> . . . . .	8
Western Kingbird, <i>Tyrannus verticalis</i> . . . . .	7
Red-shafted Flicker, <i>Colaptes cafer</i> . . . . .	6
Bullock's Oriole, <i>Icterus bullockii</i> . . . . .	6
Ash-throated Flycatcher, <i>Myiarchus cinerascens</i> . . . . .	5
Mourning Dove, <i>Zenaidura macroura</i> . . . . .	4
California Jay, <i>Aphelocoma californica</i> . . . . .	4
Nuttall's Woodpecker, <i>Dryobates nuttallii</i> . . . . .	3
Red-tailed Hawk, <i>Buteo jamaicensis</i> . . . . .	2



Sparrow Hawk, <i>Falco sparverius</i> . . . . .	2
Bush-tit, <i>Psaltriparus minimus</i> . . . . .	2
Western Meadowlark, <i>Sturnella neglecta</i> . . . . .	2
English Sparrow, <i>Passer domesticus</i> . . . . .	2
California Quail, <i>Lophortyx californica</i> . . . . .	1
Killdeer, <i>Charadrius vociferus</i> . . . . .	1
Horned Owl, <i>Bubo virginianus</i> . . . . .	1
California Woodpecker, <i>Balanosphyra formicivora</i> . . . . .	1
Tree Swallow, <i>Iridoprocne bicolor</i> . . . . .	1
House Wren, <i>Troglodytes aedon</i> . . . . .	1
Western Bluebird, <i>Sialia mexicana</i> . . . . .	1
Total number of nests found . . . . .	60

*Ground nesters.*—Three species built their nests on the ground. These were the Killdeer, California Quail, and Western Meadowlark. Four nesting pairs of these birds were observed, and all were successful in hatching their eggs. The California Quail nested in the tall grasses. They were always found about 400 yards from permanent water. The Killdeer nested on an open gravel bar near the water trough. They fed on insects, mostly on the dry stream bed. Both nests of the Western Meadowlarks were in the tall, green grass in the woods. They caught nymphs of grasshoppers for their young on the adjacent grassland.

*Tree-hole nesters.*—Eight of the 20 nesting species used holes in trees for their nests. These were the Sparrow Hawk, Red-shafted Flicker, California Woodpecker, Nuttall's Woodpecker, Ash-throated Flycatcher, Tree Swallow, House Wren, and Western Bluebird. Twenty nests of these species were counted. Sparrow Hawks were observed carrying lizards, meadow mice, and grasshoppers to their nests. Most of their foraging was done over the grassland area. The six Red-shafted Flickers selected cottonwood trees for their nests, 15 to 40 feet from the ground. They were observed to feed on ants on fallen trees and on the ground in the open grassland. One pair of California Woodpeckers nested in a dead limb on a living cottonwood 30 feet from the ground. They caught insects flying over the dry stream bed and grasshoppers on the ground. Numerous thimble-sized holes drilled in dead limbs of the oaks indicate considerable acorn storage in favorable years. Three pairs of Nuttall's Woodpeckers nested on the tract. One nest was in a dead willow 20 feet from the ground, two nests were in dead cottonwood limbs 32 and 40 feet from the ground, respectively. The birds foraged chiefly on insects under the bark on the smaller dead branches. Of five Ash-throated Flycatchers, three had nests in willows 15 feet above the

ground, and two in cottonwoods 30 and 35 feet from the ground. These flycatchers ate grasshopper nymphs and caught large flying insects in the woods. One pair of Tree Swallows had a nest 30 feet up in a dead snag of a living cottonwood. The birds generally foraged on small insects flying over the crowns of the trees over the stream bed. One pair of House Wrens succeeded in raising five young in a hole 20 feet above the ground in a dead limb on a living cottonwood. They foraged for insects near the ground and under fallen trees. One pair of Western Bluebirds raised four young in a nest 20 feet up in a dead limb of a cottonwood. They foraged on the ground at the edge of the woods and out on to the grassland for insects. In early spring the bluebirds fed on mistletoe berries.

*Branch and foliage nesters.*—Nine of the 20 nesting species constructed their nests on the branches and in the foliage of trees. These were Red-tailed Hawk, Mourning Dove, Horned Owl, Western Kingbird, California Jay, Bush-tit, Bullock's Oriole, Brewer's Blackbird, and English Sparrow. The two Red-tailed Hawks' nests were 50 and 60 feet above the ground in cottonwood trees about 300 yards apart. They foraged far out on the surrounding grasslands. One was seen returning with a pocket gopher. The young did not leave the nest until the last part of June. Four nests of Mourning Doves were located from six to 20 feet up in willows. They were observed feeding on seeds on the dry stream bed and far out on the grassland areas. A pair of Horned Owls had a nest 30 feet up in a cottonwood. Three young owls left the nest on the twentieth day of May. Presumably in this area they feed chiefly on pocket gophers. One of the nests of the Western Kingbird was built 80 feet above the ground on a cross arm of a steel power tower. The other six nests were equally divided between cottonwoods and oaks and were from 50 to 80 feet above the ground. These birds generally foraged on large insects flying above the crowns of the trees but also on grasshoppers. Three of the four nests of the California Jay were located from eight to 20 feet above the ground in willows, the other was 50 feet above the ground in a cottonwood tree. They foraged both in and out of the woods for insects. The two nests of the Bush-tit were eight and 30 feet up in willow and cottonwood trees, respectively. They foraged chiefly for small insects on the ends of the small twigs and leaves of willows. Seven young Bush-tits left one nest on June 15. The six nests of the Bullock's Oriole were located as follows: one in a willow at 20 feet above the ground; two in cottonwoods at 70 feet and 80 feet; and three in oaks at 30, 40, and 50 feet. The birds foraged for larvae of insects chiefly among the foliage of the willows. All of the eight nests of the

Brewer's Blackbird were in the same oak tree from eight to 20 feet above the ground. The Brewer's Blackbirds generally foraged in shallow water and along the moist edges of the stream. They also caught insects in the tall grasses near the edge of the woods. Two pairs of English Sparrows nested in cottonwoods in close proximity to the nests of the Red-tailed Hawks. One nest was three feet over one of the hawk nests (55 feet above the ground), and the other was built in the floor of the other hawk nest. These birds may possibly secure protection from California Jays and other predaceous species by their close proximity to the hawk nests. English Sparrows were observed to feed on grasshopper nymphs caught near the edge of the woods, and also on insects caught in the willows.

*Tree Preference.*—The following table shows the kinds of trees and the tree preferences of birds expressed in percentages.

	PER CENT OF ALL TREES—FOLIAGE NESTERS—HOLE NESTERS—ALL TREE NESTERS			
	(962 trees)	(35 nests)	(20 nests)	(55 nests)
Willow	81.8	25.7	20.0	23.6
Cottonwood	17.6	34.2	80.0	50.9
Oak	0.5	40.0	0.0	25.4

#### PROBABLE NESTERS

Other pairs of the nesting species that were regularly observed during the breeding season, but for which no nests or eggs were found are: two Western Meadowlarks, one Mourning Dove, one California Quail, and one California Jay. Because these pairs were always seen on a particular area, they were believed to have nests. None of the other birds occurred regularly enough during their breeding season to be listed as probable nesters.

#### TOTAL POPULATION

There were 60 nests actually found on the 33 acres. If to these 120 birds are added the ten probable nesters, the total number of birds nesting on the area is 130, or expressed in the standard form, this would be 394 adults (197 pairs) per hundred acres.

#### OTHER IRREGULAR AND NON-NESTING SPECIES

Fifty-one species did not nest on the tract. A few of these were irregularly observed on the area during their breeding season. Most of them, however, were migrants and either left the study area or passed through it before their breeding season began. The number included in the parentheses indicates the number of weekly trips (total of 18) on which these birds were observed. The list of the irregular and non-nesting species follows:

Great Blue Heron, *Ardea herodias*, 1; Turkey Vulture, *Cathartes aura*, 7; Cooper's Hawk, *Accipiter cooperii*, 1; Sharp-shinned Hawk, *Accipiter striatus*, 2; Marsh Hawk, *Circus cyaneus*, 1; Band-tailed Pigeon, *Columba fasciata*, 5; Nighthawk, *Chordeiles acutipennis*, 3; Lewis's Woodpecker, *Asyndesmus lewis*, 4; Downy Woodpecker, *Dendrocopos pubescens*, 1; Black Phoebe, *Sayornis nigricans*, 3; Say's Phoebe, *Sayornis saya*, 1; Traill's Flycatcher, *Empidonax traillii*, 5; Wood Pewee, *Contopus richardsonii*, 3; Violet-green Swallow, *Tachycineta thalassina*, 3; Cliff Swallow, *Petrochelidon albifrons*, 2; American Crow, *Corvus brachyrhynchos*, 1; Plain Titmouse, *Parus inornatus*, 4; White-breasted Nuthatch, *Sitta carolinensis*, 3; Brown Creeper, *Certhia familiaris*, 1; Mockingbird, *Mimus polyglottos*, 6; Robin, *Turdus migratorius*, 6; Varied Thrush, *Ixoreus naevius*, 2; Hermit Thrush, *Hylocichla guttata*, 5; Thrush, *Hylocichla ustulata*, 4; Ruby-crowned Kinglet, *Regulus calendula*, 5; Cedar Waxwing, *Bombicilla cedrorum*, 1; Phainopepla, *Phainopepla nitens*, 8; Solitary Vireo, *Vireo solitarius*, 1; Warbling Vireo, *Vireo gilvus*, 3; Orange-crowned Warbler, *Vermivora celata*, 3; Audubon's Warbler, *Dendroica auduboni*, 9; Black-throated Gray Warbler, *Dendroica nigrescens*, 3; Townsend's Warbler, *Dendroica townsendi*, 1; Macgillivray's Warbler, *Oporornis tolmiei*, 1; Pileolated Warbler, *Wilsonia pusilla*, 5; Red-winged Blackbird, *Agelaius phoeniceus*, 6; Tricolor Blackbird, *Agelaius tricolor*, 1; Brown-headed Cowbird, *Molothrus ater*, 7; Western Tanager, *Piranga ludoviciana*, 3; Black-headed Grosbeak, *Pheucticus melanocephalus*, 2; Blue Grosbeak, *Guiraca caerulea*, 11; Evening Grosbeak, *Hesperiphona vespertina*, 1; House Finch, *Carpodacus mexicanus*, 6; American Goldfinch, *Spinus tristis*, 2; Spotted Towhee, *Pipilo maculatus*, 3; Savannah Sparrow, *Passerculus sandwichensis*, 4; Lark Sparrow, *Chondestes grammacus*, 5; Oregon Junco, *Junco oregonus*, 7; White-crowned Sparrow, *Zonotrichia leucophrys*, 10; Fox Sparrow, *Passerella iliaca*, 1; and Lincoln's Sparrow, *Melospiza lincolni*, 5.

#### DISCUSSION

The desirability of expressing population as number per kilometer or mile has been pointed out by Kendeigh (1944). When only the perimeter is regarded as the edge of this area the population is 50 birds per kilometer or 81 per mile, which is higher than the 73 and 62.5 birds per mile found by Johnston (1947) for two oak-maple edge communities in Illinois. When the banks of the dry sandy stream bed of this area are also included as edge the population is 27 birds per kilometer and 43 per mile. The nesting density here of 394 birds (197 pairs) per hundred acres (40 hectares) is higher than that reported by Hering (1948) as 232 birds (116 pairs) for a ponderosa pine forest in Colorado, but lower than those reported by Kendeigh (1944) as 442 (221 pairs) and by Stewart and Aldrich (1949) as 650 (325 pairs) for climax spruce-hardwood forests in eastern United States. The population is also higher than Snyder (1950) found for three plant communities in Colorado which is given as 204 (102 pairs) for Douglas fir, and ponderosa pine, 188 (94 pairs) for Englemann spruce and subalpine fir, and 118 (59 pairs) for lodgepole pine.

Hickey (1943) in his summary of breeding bird habitats listed the results of a study by J. D. Graham and E. A. Stoner of, "A wooded

canyon with a small mountain stream in California," as having 45 adult birds per ten acres which is a higher density than recorded here. Hutchinsons (1946) reported a density of 753 for a stand of mature live oaks, *Quercus agrifolia*, along a canyon creek near Santa Barbara, California. These canyon studies must necessarily be ecotonal and show a very considerable edge effect in the populations.

Seventy-one species were recorded on the area during the study period. The 20 species nesting on the area compare closely with 18 species reported by Cooke (1916), 20 species by Hering (1948), and 22 species by Hardy (1945) for the open types of western coniferous forests.

Nearly all of the nesting species exhibit certain specific differences with respect to food and food-getting, and to nests and nesting behavior.

Cottonwood trees contained half of all the tree nests, but the five oaks had more nests in the foliage than all of the cottonwoods, which indicates high preference for oaks by Brewer's Blackbirds, Western Kingbirds, and Bullock's Orioles. However, only one oak had nests of all three of these species which indicates that other factors also enter into the selection of a nest site. Cottonwoods were also much more important for hole-nesters than other trees.

#### SUMMARY

A survey of the 1949 nesting population in a Willow-Cottonwood Community in central California was made by taking a census on a 33-acre tract for a period of five months.

The bird community is essentially an "edge" or ecotone type and supports a nesting density of 394 birds (197 pairs) per 100 acres (40 hectares) or 50 birds per kilometer of edge. Twenty species nested on the area but 71 were recorded there during the study. Each nesting species showed differences in feeding and nesting behavior. Fremont Cottonwoods were preferred by hole-nesters and Valley Oaks were preferred by foliage-nesters.

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## GEOGRAPHICAL VARIATION IN THE GRAY KINGBIRD, *TYRANNUS DOMINICENSIS*

BY PIERCE BRODKORB

THE Gray Kingbird ranges from the coasts of Florida, and less commonly of Georgia and South Carolina, through the West Indies, to the Guianas, Venezuela, and northern Colombia. It is a successful, abundant species. In the United States it is associated very closely with tide-water. In the Greater Antilles it is found from sea level to 5000 feet elevation in the mountains.

In the United States the breeding ranges of *Tyrannus dominicensis* and *Tyrannus tyrannus*, the Eastern Kingbird, are ecologically distinct. The former breeds in mangroves and other bushes or trees in the salt marsh, and the Eastern Kingbird nests inland. On Cuba and the southern Bahamas, both *T. dominicensis* and the much larger *Tyrannus cubensis* occur. The latter is a rather uncommon species with a preference for pine forest, whereas *dominicensis* inhabits open or cultivated land. On Grenada and Margarita Island, *Tyrannus melancholicus despotus* occurs with the Gray Kingbird. It is not known whether there are any ecological differences between these two species.

The Gray Kingbird is migratory in the United States, the Bahamas, Cuba, and Jamaica, occurring normally in those places from March or April to September. In Central America it appears only on migration. In northern South America, except for one apparent breeding record, it is found only in winter, from September to April or early May. In Hispaniola, Porto Rico, the Virgin Islands, the Lesser Antilles, and certain islands off the north coast of South America, it is resident throughout the year. Trinidad and the Guianas are visited during the winter by some of the Lesser Antillean population.

Males of the Gray Kingbird have more attenuated primaries than females (Fig. 1). Young birds have rounded tips on the primaries and lack the orange or yellow crown-patch of maturity. As with many other members of the Tyrannidae, the migratory races of this bird begin the molt of body feathers on the breeding grounds but do not replace the worn remiges and rectrices until after they reach winter quarters. The orange crown-patch begins to appear on young birds in August or September and is complete by December. The molt of the primaries is a slow process. In the migratory races the innermost ones are shed in September or October, and both young and old complete the molt of the primaries about the middle of March,

before migrating northward. The molt of the rectrices begins with the middle pair. Two adults from the Bahamas, taken July 4 and August 5, have already commenced the tail molt, but ordinarily the molt of the rectrices in the migratory races coincides with the molt of the primaries.



FIGURE 1. Outer primaries of *Tyrannus dominicensis fugax*, Cedar Key, Florida—Left, Adult male, No. 15743; Center, Adult female, No. 15748; Right, Juvenile female, No. 15477.

In the sedentary races the molt of the wings and tail is even more protracted than in the migratory forms. In December, birds which were hatched the previous summer still retain the outer rectrices and four or five outer primaries of the juvenal plumage. One or two outer juvenal primaries are frequently retained until the end of June or even until late in August. Such yearling birds breed while still partly in juvenal plumage. Their wings and tails are shorter than those of fully adult birds, and they have, therefore, been excluded from my tables of measurements.

During the present study 1104 specimens were assembled, as follows: Chicago Natural History Museum, 408; United States National Museum, including the Biological Survey Collection, 311; American Museum of Natural History, 187; Museum of Comparative Zoology, 89; Carnegie Museum, 72; Academy of Natural Sciences of Philadelphia, 14; University of California, 12; my own collection, 12; University of Florida, 3; collection of J. C. Dickinson, Jr., 1. To the curators in charge of the above collections I am grateful for allowing me to use their material. The drawings of the primaries were made by Miss Esther Coogle.

Diagnoses are given below of the five subspecies which it is proposed to recognize. Attention is called to the relationship of the tail to wing index to migratory habits. Those races which are migratory have relatively longer wings and shorter tails than do the sedentary races.

***Tyrannus dominicensis fugax*, new subspecies**

TYPE: Collection of Pierce Brodkorb, No. 15743; adult male; Cedar Key, Levy County, Florida; April 30, 1949; P. Brodkorb, collector.

CHARACTERS: Agrees in coloration with *Tyrannus d. dominicensis* (Gmelin), but differs in having a lower tail to wing ratio; the wing is relatively and absolutely longer, and the tail is relatively and absolutely shorter (Table 1). In addition, the culmen, tarsus, and middle toe average longer, and the wing tip and the emargination of the tail average shorter.

TABLE 1  
*Tyrannus dominicensis fugax*, MEASUREMENTS IN MILLIMETERS  
AND RATIOS IN PERCENTAGES

	Number specimens	Mean	Standard error of mean	Standard deviation	Mean $\pm$ standard deviation	Observed range
<b>Males</b>						
Wing length	115	121.0	.19	2.01	119.01-123.03	116.0-127.0
Tail length	114	92.8	.21	2.25	90.51- 95.01	87.5- 97.5
Culmen length	115	30.3	.10	1.04	29.22- 31.30	27.0- 34.0
Bill width	115	11.6	.04	0.48	11.09- 12.05	10.5- 13.0
Tarsus length	117	18.6	.05	0.58	18.00- 19.16	17.0- 19.7
Middle toe length	117	14.4	.05	0.56	13.82- 14.94	13.2- 16.0
Wing tip length	115	9.5	.11	1.17	8.34- 10.68	7.0- 13.8
Tail emargination	115	9.9	.19	2.03	7.85- 11.91	5.5- 15.5
Tail: wing ratio	114	76.7	.13	1.43	75.25- 78.11	72.7- 80.3
Culmen: wing ratio	112	25.0	.08	0.86	24.13- 25.85	22.7- 26.6
Bill width: culmen ratio	114	38.2	.14	1.49	36.72- 39.70	34.9- 41.4
<b>Females</b>						
Wing length	85	117.1	.12	1.09	116.07-118.25	113.0-119.5
Tail length	83	88.3	.22	2.04	86.29- 90.37	83.3- 93.0
Culmen length	83	29.9	.11	1.00	28.89- 30.89	26.5- 32.0
Bill width	85	11.8	.05	0.50	11.25- 12.25	10.5- 13.1
Tarsus length	86	18.9	.09	0.80	18.09- 19.69	15.5- 20.8
Middle toe length	86	14.4	.07	0.61	13.75- 14.97	13.5- 16.0
Wing tip length	85	9.5	.12	1.10	8.43- 10.63	7.5- 13.5
Tail emargination	76	8.2	.19	1.58	6.59- 9.75	5.0- 11.5
Tail: wing ratio	83	75.3	.16	1.47	73.82- 76.76	70.8- 78.5
Culmen: wing ratio	82	25.5	.09	0.83	24.69- 26.35	23.1- 27.3
Bill width: culmen ratio	82	39.4	.20	1.84	37.52- 41.20	34.4- 44.4

Differs from *Tyrannus d. vorax* Vieillot in having the upper parts paler gray, the bill narrower and less swollen, and the tail to wing and culmen to wing ratios lower. The wing averages longer, and the tail, culmen, tarsus, and middle toe average shorter.

RANGE: Breeds at tidewater along the coast of southeastern United States, from Charleston, South Carolina, to Pensacola, Florida, and in the Bahamas, except on Green Cay and Southern Ragged

Island. Winters occasionally in the interior of Florida (Madison, February 11, 1889; Lakeport, January 30-31, 1945), Hispaniola (Tortue Island, Haiti, February 4, 1917; Port au Prince, Haiti, December 24, 1927; Maiman, Dominican Republic, January 31, 1895; Saona Island, Dominican Republic, April 8, 1934), and the Virgin

TABLE 2  
AVERAGE MEASUREMENTS AND PROPORTIONS OF *Tyrannus dominicensis fugax*\*

Locality	Wing	Tail	Culmen	Tail: wing ratio
<b>Males</b>				
United States	120.2 (39)	91.9 (39)	30.2 (40)	76.5 (39)
Bahamas	121.4 (76)	93.2 (75)	30.3 (75)	76.8 (75)
<b>Females</b>				
United States	116.8 (34)	87.7 (33)	29.7 (34)	75.1 (33)
Bahamas	117.4 (51)	88.7 (50)	30.1 (49)	75.4 (50)

\* Numbers in parentheses indicate number specimens measured.

Islands (St. Croix, January 19, 1890). Occurs on migration at Grand Cayman (August 17, 1886), Little Cayman (September 10, 1886), and Aruba (May 1, 1908). It winters in northern Venezuela (Caicara, March 31, 1898; road from Colonia Tovar to El Limón, November 10, 1937) and northern Colombia (Varrud, November 5, 1914; Tucacas, October 23, 1918).

COMMENT: A specimen taken in Hillsborough County, Florida, on June 9, 1900, has one white upper tail-covert. Birds from the Bahamas average slightly larger than those from the United States (Table 2).

SPECIMENS EXAMINED: SOUTH CAROLINA: Charleston, 1 (April 30, 1840). GEORGIA: St. Simon Island, 1 (September 1, 1859). FLORIDA: Escambia Co. (Pensacola, 2); Franklin Co. (St. George Island, 1); Wakulla Co. (St. Marks lighthouse, 4); Madison Co. (Madison, 1); Levy County (Cedar Key, 9); Pasco Co. (Anclote Keys, 4); Pinellas Co. (near Seven Oaks, 7; Passage Key, 1; Indian Pass, 1); Hillsborough Co., 1; Manatee Co. (Anna Maria Key, 1); Sarasota Co. (Sarasota, 1); Charlotte Co. (Charlotte Harbor, 1); Lee Co. (Punta Rassa, 1; Caxambas, 1); Collier Co. (Indian Key, 1); Monroe Co. (Cape Sable, 1; Key Largo, 2; Big Pine Key, 2; Cudjoe Key, 1; No Name Key, 2; Nameless Keys, 1; Bamboo Key, 1; Key West, 4; "Keys," 1); Glades Co. (Lakeport, 1); St. Johns Co. (Matanzas, 1; Fort Matanzas, 2; Matanzas Inlet, 5); Volusia Co. (Oak Hill, 5; New Smyrna, 1); Dade Co. (Miami Beach, 1); not further specified, 6.

BAHAMAS: Grand Bahama, 7; Abaco, 17; Green Turtle Cay, 1; Eleuthera, 3; New Providence, 8; Hog Island, 1; Andros, 6; Long Island, 1; Crooked Island, 1; Fortune Island, 1; Acklin Island, 7; Castle Island, 1; Plana Cay, 2; Mariguana, 6; West Caicos, 1; Providenciales, 1; East Caicos, 2; Pine Cay, 1; Grand Turk, 2; Little Inagua, 4; Inagua, 78; Johnsons Cay, 1; Little Golden Key, 1; Bimini, 2 (atypical); Watlings Island, 1 (atypical).

GRAND CAYMAN, 1. LITTLE CAYMAN, 2. HAITI (Tortue Island, 1; Port au Prince 1). DOMINICAN REPUBLIC (Maiman, 1; Saone Island, 1). St. Croix, 1. Aruba, 3. VENEZUELA (Guiribana de Caicara, 1; road from Colonia Tovar to El Limón, 1). COLOMBIA (Vartud, 1; Tucacas, 1). No locality specified, 2. Total, 249.

***Tyrannus dominicensis sequax*, new subspecies**

TYPE: United States National Museum, No. 172802; adult male; Nueva Gerona, Isle of Pines; July 10, 1900; William Palmer and J. H. Riley, original number 661.

CHARACTERS: Agrees with *T. d. fugax* in color and proportions, but smaller throughout (Table 3); weight less (43 grams in one female; two males and two females of *fugax* weighed 51.0–51.8 and 51.6–66.1 grams, respectively).

Agrees with *T. d. dominicensis* in color, but differs in having the tail shorter and the tail to wing index lower.

TABLE 3  
*Tyrannus dominicensis sequax*, MEASUREMENTS IN MILLIMETERS  
AND RATIOS IN PERCENTAGES

	Number specimens	Mean	Standard error of mean	Standard deviation	Mean $\pm$ standard deviation	Observed range
<i>Males</i>						
Wing length	33	115.6	.28	1.60	113.95–117.15	112.0–118.0
Tail length	30	88.6	.36	1.95	86.62–90.52	85.5–94.5
Culmen length	33	28.5	.17	0.98	27.56–29.52	26.5–30.2
Bill width	33	11.1	.08	0.45	10.61–11.51	10.0–12.0
Tarsus length	33	18.2	.09	0.50	17.66–18.66	17.0–19.2
Middle toe length	33	14.0	.11	0.64	13.36–14.64	12.5–15.2
Wing tip length	33	8.9	.20	1.15	7.73–10.03	7.0–11.5
Tail emargination	30	9.2	.22	1.19	8.03–10.41	6.5–11.5
Tail: wing ratio	30	76.6	.26	1.40	75.17–77.97	74.7–80.1
Culmen: wing ratio	33	24.7	.15	0.87	23.86–25.60	22.8–26.1
Bill width: culmen ratio	33	38.8	.33	1.92	36.83–40.67	35.4–42.9
<i>Females</i>						
Wing length	24	111.8	.44	2.15	109.66–113.96	107.0–116.0
Tail length	24	83.7	.54	2.66	81.03–86.35	80.0–88.2
Culmen length	25	28.0	.17	0.84	27.20–28.88	26.5–30.0
Bill width	25	11.1	.11	0.53	10.53–11.59	10.0–12.2
Tarsus length	25	18.8	.10	0.52	18.32–19.36	18.0–19.5
Middle toe length	25	14.1	.12	0.58	13.51–14.67	12.5–15.0
Wing tip length	25	9.1	.28	1.42	7.63–10.47	6.0–12.5
Tail emargination	23	7.7	.31	1.49	6.16–9.14	5.5–11.5
Tail: wing ratio	24	74.9	.33	1.60	73.26–76.46	72.1–77.9
Culmen: wing ratio	24	25.1	.21	1.02	24.11–26.15	23.3–27.2
Bill width: culmen ratio	25	39.6	.43	2.15	37.48–41.78	34.7–44.8

Differs from *T. d. vorax* in having the upper parts paler gray; the tail, culmen, width of bill, and tarsus smaller; the tail to wing and

culmen to wing ratios lower; and the wing, middle toe, wing tip, and emargination of the tail averaging shorter.

TABLE 4  
AVERAGE MEASUREMENTS AND PROPORTIONS OF *Tyrannus d. sequax*  
AND *Tyrannus d. dominicensis* IN THE GREATER ANTILLES

Locality	Wing	Tail	Culmen	Tail: wing ratio
<b>Males</b>				
Cuba	115.1 (13)	89.0 (10)	28.5 (13)	77.4 (10)
Isle of Pines	115.9 (8)	88.1 (8)	28.9 (8)	76.0 (8)
Caymans	115.8 (12)	88.3 (12)	28.3 (12)	76.3 (12)
Jamaica	118.5 (2)	91.8 (2)	29.8 (2)	77.4 (2)
Hispaniola	115.9 (62)	93.0 (59)	28.2 (60)	80.2 (59)
Porto Rico	117.3 (46)	96.6 (47)	28.8 (66)	82.4 (47)
Virgin Islands	118.9 (57)	97.2 (56)	28.9 (59)	81.7 (55)
<b>Females</b>				
Cuba	111.1 (13)	83.0 (13)	28.2 (14)	74.7 (13)
Isle of Pines	112.0 (4)	83.0 (4)	27.8 (4)	74.1 (4)
Caymans	113.0 (7)	85.3 (7)	27.9 (7)	75.6 (7)
Jamaica	114.4 (4)	86.4 (4)	29.3 (3)	75.5 (4)
Hispaniola	112.3 (56)	88.8 (53)	28.3 (58)	78.9 (53)
Porto Rico	113.2 (58)	90.8 (57)	28.4 (60)	80.3 (55)
Virgin Islands	114.4 (46)	91.5 (46)	29.0 (50)	79.8 (43)

RANGE: Breeds on Cuba, the Isle of Pines, and the Cayman group, and probably on Green Cay (April 13, 1886) and Southern Ragged Island (April 5, 1907) in the southern Bahamas. Occurs on migration on the Dry Tortugas (April 24 and 30, May 1 and 2, 1890) (it will be noted that *sequax* was collected at Key West during the same month and year; according to Alexander Sprunt (in corres.) the Gray Kingbird does not breed on the Dry Tortugas but is common on migration); at Key West, Florida (May 9, 1890); at Greytown, Nicaragua (March 23, 1892); at Colon (March 12 and 17, 1908), Perme (October 22, 1929), and Obaldia (September 21, 1930), Panama. Occasional in winter on Cuba, the Isle of Pines, and Anegada, Virgin Islands (December 29 and 30, 1889). Winters commonly in Venezuela and northern Colombia.

COMMENT: Birds from Jamaica are tentatively referred here, but the number of Jamaican specimens is inadequate. The data in table 4 illustrate the differences in size of *sequax* and *dominicensis* in the various Greater Antilles.

*Sitta curvirostris* Hermann (Tab. Aff. Anim., 1783: 204) has been suggested by Stresemann (Nov. Zool., 27: 329, 1920) as an earlier name for the Gray Kingbird. This name was based on Sloane's "Loggerhead" from Jamaica. Hellmayr (Cat. Birds Americas, 5: 111, 1927) considers Hermann's name unidentifiable. I have not been able to



consult either Sloane or Hermann in this connection, but I should like to point out that the vernacular name "loggerhead" is applied in the West Indies to *Tolmarchus caudifasciatus*, whereas *Tyrannus dominicensis* is called "pipiri" or "titiri." These two species are so similar superficially that specimens of *Tolmarchus* were sent to me from several museums when I asked for *Tyrannus*. If Hermann's name should prove identifiable, it may turn out to be an earlier name for *Tolmarchus caudifasciatus jamaicensis* (Chapman).

Three specimens collected by Cherrie in Venezuela form the only basis for believing the Gray Kingbird breeds on the mainland of South America. A pair was collected at Agua Salada de Ciudad Bolívar on April 13, 1907. This date is well within the normal stay of wintering *sequax* in South America, and the two specimens fall within the normal range in size for that race, although they are perhaps a trifle paler than most. The third specimen is an apparently full-grown, juvenile male, taken at Las Barrancas in the Orinoco delta on August 3, 1907. This young bird is also pale but otherwise resembles *sequax*. Whether there is actually a breeding colony on the Orinoco and what its subspecific status may be must await further field work.

SPECIMENS EXAMINED: CUBA, 34. ISLE OF PINES, 13. GRAND CAYMAN, 9. LITTLE CAYMAN, 2. CAYMAN BRAC, 8. JAMAICA, 10. DRY TORTUGAS, 5. BAHAMAS: Southern Ragged Island, 1; Green Cay, 2. VIRGIN ISLANDS: Anegada, 2. FLORIDA: Key West, 1. NICARAGUA: Greytown, 2. PANAMA: Colon, 3; Perme, 1; Obaldia, 1. VENEZUELA: Zulia (Encontrados, 6, November 27-28, February 10-18); Falcón (Tucacas, 2, October 21); Lara (Barquisimeto, 1, November 12); Guárico (El Sombrero, 1, November 18); Aragua (Ocumare de la Costa, 1, October 30); Bolívar (Agua Salada, 2, April 13); Monagua (Las Barrancas, 1, August 3); Valeria, 1, March 11; Río Aurare, 1, January 23; Paraguana, 1, February 5; Colonia Tovar, 1, November 15. COLOMBIA: Magdalena (Trojas de Cataca, 1, October 13; Bonda, 3, September 20, October 14, March 24; Fundación, 1, October 11; Punto Caiman, 1, October 2; Buritaca, 1, September 19; Remolino, 1, January 25; Tucurínca, 1, September 21; Mamatoco, 2, April 21; Santa Marta, 2, February 8; Riohacha, 2, May 7); Atlántico (near Aguada de Pablo, 1, February); Bolívar (Cartagena, 1; Calamar, 1, January 2); Huila (Villavieja, 1, February 4); Antioquia, 1; Tolima (Honda, 2, December 20, January 27); Chocó (Noanamá, 2, December 29, January 1). No locality specified, 2. Total, 138.

#### TYRANNUS DOMINICENSIS DOMINICENSIS (Gmelin)

- Lanius tyrannus*  $\beta$  *dominicensis* Gmelin, Syst. Nat., ed. 13, (1): 302, 1788 (Santo Domingo, based on Brisson).  
*Tyrannus griseus* Vieillot, Hist. Nat. Ois. Amér. Sept., 1: 76, pl. 46, 1807 (Santo Domingo).  
*Tyrannus matulinus* Vieillot, Nouv. Dict. Hist. Nat., ed. 2, 35: 82, 1819 (Santo Domingo).  
*Tyrannus titiri* Temminck, Tabl. Méth. Pl. Col., Jan., 1839; 24 (Santo Domingo, young).

**CHARACTERS:** Differs from *T. d. fugax* and *T. d. sequeax* as diagnosed above. Differs from *T. d. vorax* in having the upper parts paler gray, the bill shorter and less swollen, and the culmen to wing ratio lower (Table 5). In addition, the tarsus and middle toe average shorter.

TABLE 5  
*Tyrannus dominicensis dominicensis*, MEASUREMENTS IN MILLIMETERS  
AND RATIOS IN PERCENTAGES

	Number of specimens	Mean	Standard error of mean	Standard deviation	Mean $\pm$ standard deviation	Observed range
<b>Males</b>						
Wing length	182	117.3	.18	2.37	114.96-119.70	110.0-124.5
Tail length	174	95.5	.24	3.21	92.29-98.71	81.0-103.0
Culmen length	185	28.6	.08	1.11	27.53-29.75	26.0-32.2
Bill width	187	11.1	.04	0.49	10.57-11.55	9.5-12.2
Tarsus length	188	18.3	.05	0.64	17.65-18.93	16.1-19.5
Middle toe length	187	14.1	.05	0.70	13.42-14.82	12.5-16.0
Wing tip length	168	9.8	.10	1.35	8.43-11.13	7.0-13.0
Tail emargination	161	11.4	.17	2.20	9.23-13.63	6.0-17.0
Tail: wing ratio	173	81.3	.16	2.13	79.19-83.45	73.6-87.4
Culmen: wing ratio	179	24.4	.06	0.89	23.54-25.32	21.8-27.4
Bill width: culmen ratio	184	38.5	.14	1.88	36.62-40.38	34.5-43.6
<b>Females</b>						
Wing length	160	113.3	.17	2.10	111.15-115.35	106.0-119.0
Tail length	156	90.3	.23	2.93	87.37-93.23	82.5-98.0
Culmen length	168	28.6	.08	1.01	27.56-29.58	25.5-30.5
Bill width	167	11.4	.03	0.45	10.91-11.81	10.2-12.5
Tarsus length	169	18.7	.05	0.65	18.04-19.34	16.5-20.8
Middle toe length	169	14.3	.05	0.68	13.60-14.96	12.8-16.0
Wing tip length	153	9.7	.09	1.17	8.55-10.89	7.5-12.5
Tail emargination	140	9.4	.17	2.01	7.40-11.42	4.5-14.5
Tail: wing ratio	151	79.7	.15	1.89	77.79-81.57	74.3-85.3
Culmen: wing ratio	157	25.3	.07	0.82	24.43-26.07	22.8-27.1
Bill width: culmen ratio	167	39.8	.12	1.60	38.19-41.39	35.6-43.9

**RANGE:** Permanent resident in the Greater Antilles (Hispaniola and outlying islands, Mona, Porto Rico, Vieques, Culebra, and the Virgin Islands) and the northernmost Lesser Antilles (Anguilla, St. Martin, St. Barthelemy, St. Eustatius, St. Kitts, and Nevis).

**COMMENT:** Although Hispaniola is the type locality for all of the names which have been applied to this race, birds from that island are less well differentiated than those from Porto Rico and the Virgin Islands (Table 4).

An adult male from Beata Island, Dominican Republic, collected by Wetmore and Lincoln on May 11, 1931, is abnormally small and has a remarkably short tail. It has the following measurements: wing, 110; tail, 81; culmen, 27.5; width of bill at nostrils, 11; tarsus, 17.5; middle

toe, 13.8; wing-tip, 7.5; emargination of tail, 6.8 mm.; tail to wing ratio, 73.64; culmen to wing, 25.00; and width of bill to culmen, 40.0 per cent. Four other males from Beata, however, taken in February and April, the latter with enlarged testes, have: wing, 114.5-120.5; tail, 93.5-98 mm.; and tail to wing index, 80.51-81.93 per cent. The May bird, therefore, seems to represent an abnormal condition rather than a trend toward differentiation.

SPECIMENS EXAMINED: HAITI, 27. GRAND CAYEMITES, 1. LITTLE CAYEMITES, 3. GONAVE, 6. PETITE GONAVE, 3. ILE A VACHE, 2. TORTUE ISLAND, 6. DOMINICAN REPUBLIC, 90. BEATA, 5. MONA, 10. PORTO RICO, 119. CULEBRA, 9. VIEQUES, 19. ST. THOMAS, 25. ST. JOHNS, 1. TORTOLA, 10. VIRGIN GORDA, 36. ANEGADA, 22. SALT ISLAND, 1. BEEF ISLAND, 1. ST. CROIX, 30. ANGUILLA, 3. ST. MARTIN, 5. ST. BARTHELEMY, 1. ST. EUSTATIUS, 7. ST. KITTS, 7. NEVIS, 4. Total, 453.

#### TYRANNUS DOMINICENSIS VORAX Vieillot

*Tyrannus vorax* Vieillot, Nouv. Dict. Hist. Nat., ed. 2, 35: 90, 1819 (Martinique).  
*Tyrannus rostratus* Sclater, Ibis, 6: 87, footnote, January, 1864 (locality of the type unrecorded).

CHARACTERS: The differences between this and the previously treated races have already been mentioned. The principal characters are the dark gray upper parts, the large, heavy bill, and the high tail to wing ratio (Table 6). In addition, the upper tail-coverts seem more often to have rusty colored tips than is the case with the other races.

RANGE: Resident in the Lesser Antilles from Barbuda, Antigua, and Montserrat, south to Grenada. In winter occurs also on Trinidad and in French, Dutch, and British Guiana. One undated specimen from St. Eustatius has been examined; other skins from that island are of *dominicensis*.

COMMENT: The type of *Tyrannus rostratus* is without recorded locality; the paratype is from Trinidad. Several different authors have conjectured as to the place of origin of the type. Since, according to Sclater, it is of the "make" of Cayenne trade skins, and since the present race is now known to winter in that colony, I restrict the type locality to Cayenne, French Guiana.

Richardson noted the color of the iris of two specimens from Guadeloupe as being yellow. Young and adults from Dominica, St. Lucia, and St. Vincent have the iris recorded by various collectors, including Richardson, as brown in 11 cases, and once each as dark brown, light brown, light reddish brown, or hazel. In all the other races of this species the iris is brown.

Specimens from Barbados, Grenada, and the Grenadines are smaller than those from more northern islands, but the series available is inadequate to demonstrate this conclusively (Table 7).

TABLE 6  
*Tyrannus dominicensis vocax*, MEASUREMENTS IN MILLIMETERS AND  
RATIOS IN PERCENTAGES

	Number of specimens	Mean	Standard error of mean	Standard deviation	Mean $\pm$ standard deviation	Observed range
<i>Males</i>						
Wing length	55	119.0	.30	2.22	116.76-121.20	113.3-123.5
Tail length	52	95.3	.33	2.41	92.91- 97.33	89.5-100.0
Culmen length	59	32.1	.16	1.24	30.88- 33.36	29.0- 35.0
Bill width	60	12.9	.08	0.59	12.35- 13.53	12.0- 14.2
Tarsus length	60	19.4	.08	0.60	18.79- 19.99	18.2- 20.5
Middle toe length	60	14.9	.10	0.78	14.09- 15.65	13.5- 16.5
Wing tip length	52	10.1	.14	1.02	9.10- 11.14	7.0- 12.5
Tail emargination	52	9.6	.20	1.43	8.20- 11.06	6.5- 12.5
Tail: wing ratio	50	80.0	.19	1.35	78.61- 81.31	76.8- 83.3
Culmen: wing ratio	54	27.1	.13	0.96	26.09- 28.01	24.2- 29.4
Bill width: culmen ratio	59	40.4	.22	1.67	38.70- 42.04	37.5- 45.0
<i>Females</i>						
Wing length	53	115.5	.27	1.93	113.61-117.27	111.5-119.0
Tail length	53	90.3	.34	2.48	87.82- 92.78	84.5- 95.5
Culmen length	59	31.7	.13	1.00	30.67- 32.67	29.0- 33.5
Bill width	59	13.3	.07	0.51	12.75- 13.77	12.0- 14.2
Tarsus length	59	19.5	.10	0.74	18.72- 20.20	17.5- 21.0
Middle toe length	58	14.6	.10	0.76	13.81- 15.33	12.5- 16.0
Wing tip length	52	10.2	.16	1.17	9.05- 11.39	8.0- 14.5
Tail emargination	43	7.4	.27	1.75	5.66- 9.16	4.5- 11.5
Tail: wing ratio	50	78.3	.19	1.34	76.92- 79.60	75.1- 82.3
Culmen: wing ratio	53	27.5	.12	0.87	26.59- 28.33	27.8- 30.0
Bill width: culmen ratio	59	41.9	.21	1.58	40.32- 43.38	37.5- 45.5

TABLE 7  
AVERAGE MEASUREMENTS OF ADULT MALES OF *Tyrannus dominicensis vocax*

Locality	Number of specimens	Wing	Tail	Culmen	Tail to wing ratio
Barbuda	3	121.0	97.8	32.1	80.8
Antigua	17	119.9	94.9	31.4	79.4
Guadeloupe	5	119.8	96.2	31.8	80.1
Dominica	8	120.0	96.3	32.9	80.1
Martinique	3	121.5	97.8	33.4	80.1
St. Lucia	11	120.2	95.4	32.6	79.4
St. Vincent	7	119.1	96.6	31.5	81.2
Barbados	4	117.5	95.5	31.3	80.9
Grenadines	13	116.9	93.4	31.7	79.7
Grenada	7	118.3	94.9	32.0	80.2

SPECIMENS EXAMINED: ST. EUSTATIUS, 1. MONTSERRAT, 2. BARBUDA, 13. ANTIGUA, 33. GUADELOUPE, 14. DESIRADE, 1. MARIE GALANTE, 1. DOMINICA, 24. MARTINIQUE, 5. ST. LUCIA, 30. ST. VINCENT, 20. BARBADOS, 12. BEQUIA, 7. MUSTIQUE, 4. CANNOUNAN, 1. MAYREAU, 2. UNION, 7. PETITE MARTINIQUE, 1.

CARRIACOU, 7. GRENADA, 17. TRINIDAD: Laventille, 1 (December 15); Seelet, 1 (April 7). BRITISH GUIANA: Buxton, 1 (December 25); unspecified, 1. DUTCH GUIANA: Paramaribo, 3 (December 11 and 21, January 19). FRENCH GUIANA: Cayenne, 4 (October 16, November 18, January 8 and 17); Mana, 2 (September 10, October 30). Total, 215.

### *Tyrannus dominicensis tenax*, new subspecies

TYPE: United States National Museum, No. 151714; adult male; Margarita Island, Venezuela; July 7, 1895; Wirt Robinson, collector; original number 453.

CHARACTERS: It is the smallest race of the species (Table 8). Differs from *T. d. fugax* in having the wing shorter and the tail to wing ratio higher; the tail averages longer, and the bill averages shorter,

TABLE 8  
*Tyrannus dominicensis tenax*, MEASUREMENTS IN MILLIMETERS AND  
RATIOS IN PERCENTAGES

	Number of specimens	Mean	Standard error of mean	Standard deviation	Mean $\pm$ standard deviation	Observed range
<i>Males</i>						
Wing length	13	113.4	.41	1.48	111.94-114.90	110.0-115.0
Tail length	13	93.7	.72	2.59	91.10- 96.28	88.0- 98.0
Culmen length	11	29.2	.21	0.70	28.47- 29.87	27.8- 30.2
Bill width	13	11.4	.13	0.46	10.94- 11.86	10.5- 12.2
Tarsus length	13	18.4	.11	0.41	17.95- 18.77	17.5- 19.5
Middle toe length	13	13.5	.26	0.95	12.53- 14.43	12.5- 15.0
Wing tip length	13	18.0	.35	1.28	8.70- 11.26	8.0- 12.5
Tail emargination	10	10.1	.93	2.93	7.17- 13.03	6.0- 15.5
Tail: wing ratio	13	82.6	.42	1.50	81.09- 84.09	80.0- 85.6
Culmen: wing ratio	11	25.8	.21	0.69	25.07- 26.45	24.6- 26.7
Bill width: culmen ratio	11	39.1	.62	2.05	37.03- 41.13	36.1- 43.9
<i>Females</i>						
Wing length	10	111.1	.43	1.37	109.68-112.42	109.0-113.0
Tail length	9	91.2	.30	0.90	90.34- 92.14	89.5- 93.0
Culmen length	10	29.3	.24	0.75	28.55- 30.05	28.0- 31.0
Bill width	10	12.1	.11	0.35	11.73- 12.43	11.5- 12.5
Tarsus length	10	19.1	.12	0.37	18.71- 19.45	18.5- 19.5
Middle toe length	10	13.8	.12	0.37	13.39- 14.13	12.8- 14.5
Wing tip length	10	9.4	.31	0.98	8.42- 10.28	7.5- 11.0
Tail emargination	9	8.6	.31	1.54	7.04- 10.12	5.5- 11.5
Tail: wing ratio	9	82.0	.32	0.96	81.04- 82.96	80.5- 83.4
Culmen: wing ratio	10	26.4	.26	0.83	25.56- 27.22	25.0- 28.3
Bill width: culmen ratio	10	41.3	.55	1.75	39.50- 43.00	39.0- 43.4

Differs from *T. d. sequax* in having the tail longer and the tail to wing ratio higher; the wing averages shorter and the bill longer.

Differs from *T. d. dominicensis* in its shorter wing. In addition, the bill averages larger, and the tail to wing and culmen to wing ratios average higher.

Differs from *T. d. vorax* in having the upper parts paler gray, the wing, bill, and tarsus smaller, the tail to wing ratio higher, and the culmen to wing ratio lower.

RANGE: Resident on Margarita, Curaçao, and Bonaire islands.

TABLE 9  
AVERAGE MEASUREMENTS AND PROPORTIONS OF *Tyrannus dominicensis tenax*

Locality	Number of specimens	Wing	Tail	Culmen	Tail to wing ratio
<i>Males</i>					
Margarita	3	112.7	92.0	28.8	81.7
Curaçao	10	113.7	94.2	29.3	82.9
Bonaire	5	116.4	99.0	29.4	83.5
<i>Females</i>					
Margarita	3	111.3	92.0	29.3	81.8
Curaçao	7	110.9	91.0	29.2	82.1
Bonaire	2	109.8	88.5	29.0	80.7

COMMENT: Possibly more than one population may be involved on the three islands mentioned above (Table 9). Birds from Bonaire have been excluded from the measurements of this race given in Table 8.

SPECIMENS EXAMINED: MARGARITA ISLAND, 6 (January, February, March, July). CURAÇAO, 21 (March, April, May, June, July). BONAIRE, 7 (May, July). Total, 34.

Department of Biology, University of Florida, Gainesville, Florida,  
July 21, 1949.



## RECENT OBSERVATIONS ON THE WHITE PELICAN ON GUNNISON ISLAND, GREAT SALT LAKE, UTAH

BY JESSOP B. LOW, LEE KAY, D. I. RASMUSSEN

INTEREST has steadily mounted in the precarious plight of the gregarious, colony-nesting, White Pelicans, *Pelecanus erythrorhynchos*, which in the United States in 1932 numbered somewhere in the neighborhood of 30,000 birds in seven large and about 50 small breeding colonies (Thompson, 1932). In the perpetuation of a bird with so few "baskets" for its eggs, the success of each colony is highly important.

Because of the remoteness and inaccessibility of the colonies nesting on the islands of Great Salt Lake, opportunities for study by ornithologists have been limited to short visits during the past 35 years. Juvenile pelicans have been banded as a part of the activities of the ornithologists. Studies of life history, present status and economic importance, picture-taking for educational films, and sight-seeing have largely motivated the parties which have visited the islands during the last few years. These present studies have been made through the Utah Cooperative Wildlife Research Unit supported jointly by the Utah State Agricultural College, the Wildlife Management Institute, the Utah Fish and Game Department, and the U. S. Fish and Wildlife Service. To William Marshall, Wildlife Professor, University of Minnesota, and to Noland Nelson, Federal Aid Biologist, Utah Fish and Game Department, thanks are given for assistance rendered in field work and in preparation of the manuscript.

Banding returns on the pelicans from Gunnison Island have shed some light on the wintering grounds of the pelicans, causes of death, and travels of the pelicans after leaving their island nesting grounds.

The interesting group of islands of Great Salt Lake, of which Gunnison is one, has been described geologically by Gilbert (1890) and climatically by Alter (1936). Eardley (1938) studied the lake bottom and Adams (1932) described the lake levels and variations. Writers, beginning with Stansbury (1852), have recorded the birds on the islands, while the mammals have been studied by Marshall (1940) who listed earlier workers.

Gunnison Island, one of seven islands in the million-acre Great Salt Lake, is located approximately 55 miles northwest of Salt Lake City and about six miles from the west side of the lake. The island attains an altitude of several hundred feet above the lake shore which is 4,215

feet above sea level. Of the four types of island habitat—(a) salt flats, (b) sand bars, (c) benchlands, and (d) original land above the highest level of ancient Lake Bonneville—occurring presently on the islands of Great Salt Lake, Gunnison Island has the first three types. The island is roughly a mile long and half a mile wide, running in a north-south direction (Fig. 1). There is a low saddle between two higher hills on either end of the island. Bays are on either side of the saddle. Sand forms the benchlands around the bays on which the nesting colonies of pelicans are located. A small rocky point called Cub Island is located just off the north tip of Gunnison Island but has not supported pelican nests.

Vegetation of the island consists largely of *Sarcobatus vermiculatus* along the edge of the shore on the sandbars; *Atriplex confertifolia* and *Bromus tectorum* occupy the higher and southern exposures on the benchlands. Other plants occurring on the island include *Allenrolfea occidentalis*, *Artemisia spinescens* and *Eriogonum tenellum* and perhaps other desert-type plants.

Mammal life of Gunnison Island consists only of two species, the white-footed mouse, *Peromyscus m. gunnisoni*, and the kangaroo rat, *Dipodomys m. alfredi* (Marshall, 1940). Nesting bird life of the island, in addition to the pelicans, consists of: California Gulls, *Larus californicus*; Treganza's Heron, *Ardea h. treganzai*; Raven, *Corvus corax*; Prairie Falcon, *Falco mexicanus*; and Rock Wren, *Salpinctes o. obsoletus*.

The records of the White Pelican colonies on the islands of Great Salt Lake started with the historical journey of Stansbury to Gunnison Island in 1852. Stansbury (1852) recorded only that immense flocks of pelicans, as well as many thousands of gulls, were seen and heard. Little was written again until Henshaw (1875, 1879) noted that the flocks of pelicans, formerly reported in great abundance in the vicinity of Great Salt Lake, were no longer nesting on the islands and had become casual visitors, after much clubbing and slaughtering. Thompson in 1932 gave an estimate of 2000 birds by Dave Madsen for Gunnison and islands other than Bird Island where an estimated 8000 adult birds were nesting. Woodbury and Behle (1932) and Behle (1935) recorded 6600 adult birds and an estimated 3300 nests on Gunnison Island in 1932. Kay (1935, *in litt*) and Bailey (1935) counted 2000 adults and somewhat fewer nests than recorded by Behle in 1932. Kay also pointed out that there were 16 nesting colonies on the islands with birds, varying from 50 to 1000 birds each and that six of the colonies averaged 150 nests (Table 1).

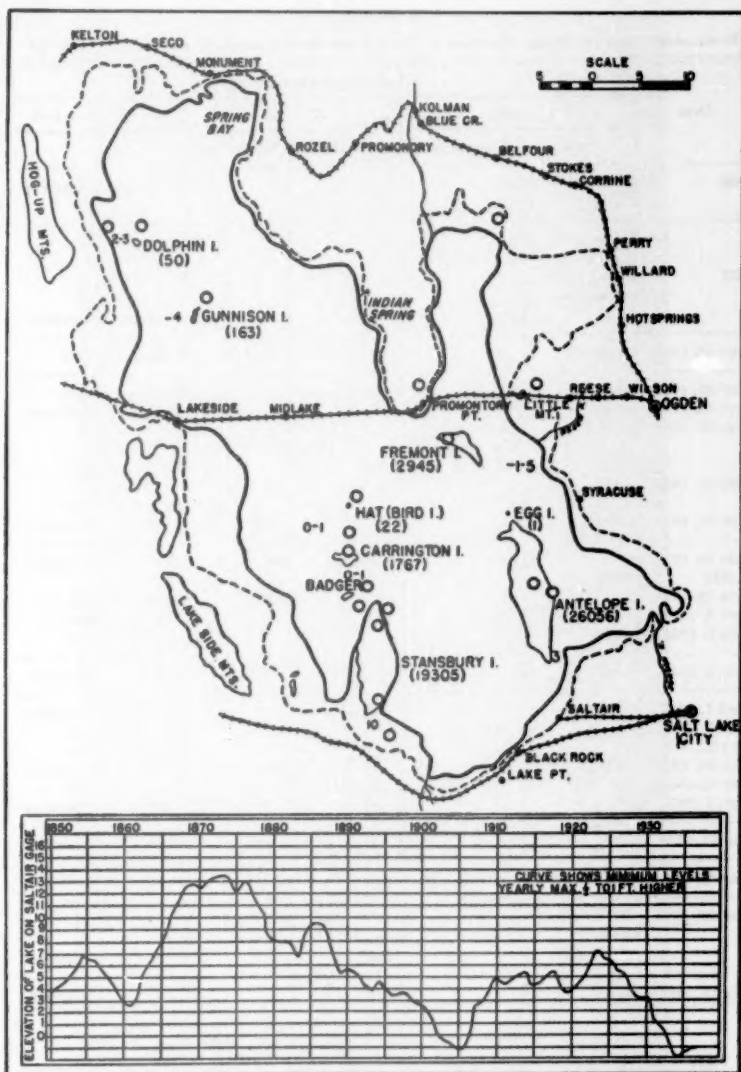


FIGURE 1. Principal points in northwest part of the Great Salt Lake.

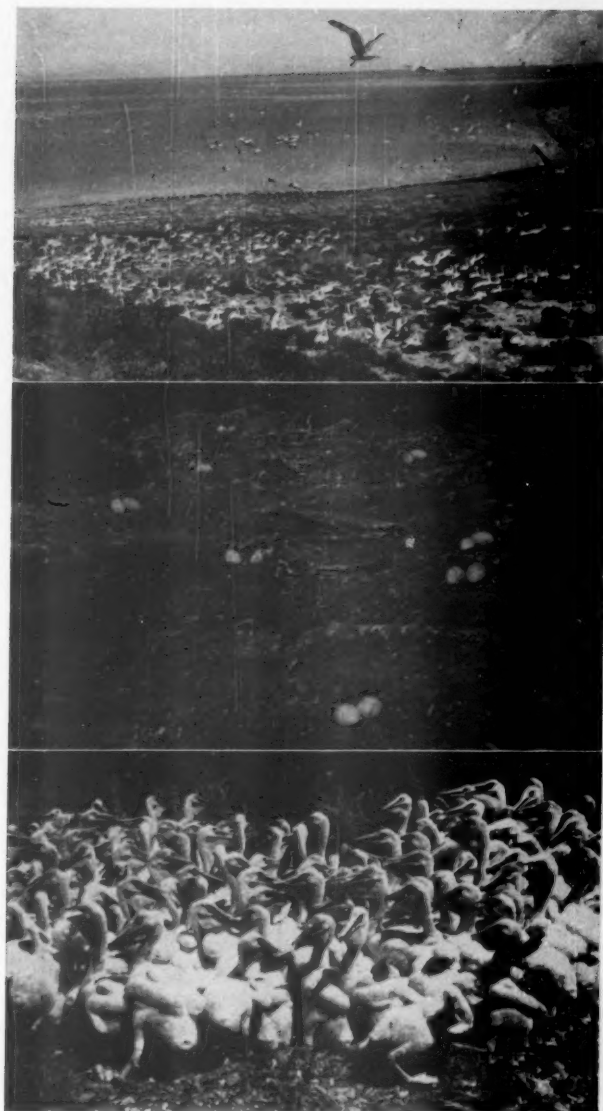
TABLE 1

POPULATION DATA ON WHITE PELICANS, GUNNISON AND BIRD ISLANDS, GREAT SALT LAKE, UTAH

Date	Number pelicans reported					Observer	Island
	Adults		Juveniles				
	Birds	Nesting pairs	Number	Number nests			
1850	Immense flocks				Stansbury	Gunnison	
1875	Formerly in great abundance, now casual visitants				Henshaw	Gunnison	
May 15, 1915	2,000				Palmer	Bird	
May 15, 1932	8,000	2,000 counted 4,000 total estimated	1,500		Thompson	Bird	
May 15, 1932	2,000				Thompson	Gunnison	
May 15, 1932	3,000		1,500		Behle	Bird	
May 15, 1932	4,000				Woodbury and Behle	Bird	
June 29, 1932	6,600				3,300	Behle	Gunnison
June 18, 19, 1935	2,000		16 colonies	900 (6 colonies)	Kay	Gunnison	
June 19, 1935				3,300	Bailey	Gunnison	
June 4, 1935	300				Kay	Bird	
June 1, 1935	400					Bird	
June 4, 1936	2,868			3,300	Kay	Gunnison	
April 7, 1937		308			Marshall	Gunnison	
April 7, 1937		55			Marshall	Bird	
June 22, 1937		373			Marshall	Bird	
June 23, 1937	439		775	190 approx.	Marshall	Gunnison	
July 11, 1937			200 pods		Kay	Bird	
Sept. 7, 1937			65		Marshall	Gunnison	
July 11, 1938			1,800	1,600	Cottam	Gunnison	
May 29, 1943	3,700			20 colonies	Behle	Gunnison	
June 19, 1947	972 (10 colonies)		3,673 + 80 eggs (14 colonies)	2,617 (14 colonies)	Low	Gunnison	
July 15, 1948	1,593		1,085		Low	Gunnison	

## BANDING OF THE WHITE PELICAN

During the past ten years, 1938 to 1948, a total of 600 juvenile White Pelicans have been banded on Gunnison Island by five different banders (Table 2). Dates of banding have varied from June 19 to July 15. Young pelicans have varied in age at banding time from an estimated three to ten weeks of age and have been roughly one-fourth



(Upper) PART OF GUNNISON ISLAND, ONE OF THE BREEDING GROUNDS OF WHITE PELICANS IN GREAT SALT LAKE.

(Middle) NESTS OF WHITE PELICANS ON GUNNISON ISLAND.

(Lower) A POD OF YOUNG WHITE PELICANS ON GUNNISON ISLAND.





to full grown. None of the pelicans had flight feathers at the time of banding (Plate 11, *lower*).

Regurgitation of food by the young pelicans was a common occurrence during the banding operation. To avoid this regurgitation of food, the pelicans were generally banded early in the morning before the young had been fed. An attempt was made to band only a sample of the birds each year; the ease of banding would have made it possible to band large numbers if it had been considered desirable. The great disturbance to the young birds and their offensive odor were factors which limited largely the numbers banded.

TABLE 2

BANDING DATA ON WHITE PELICANS, GUNNIBSON ISLAND, GREAT SALT LAKE, UTAH

<i>Date</i>	<i>Pelicans banded</i>	<i>Bander</i>
July 11, 1938 July 12, 1938	97	Rasmussen, Kay
June 22, 1940	100	Rasmussen, Kay
June 23, 1943 May 29, 1943	100 40	Rasmussen, Kay Behle
July 3, 1946	100	Nelson, Kay
June 19, 1947	100	Low, Nelson, Kay
July 15, 1948	63	Low, Kay

Of the 600 juvenile pelicans banded, there have been 26 returns, a 4.3 per cent recovery (Table 3). Slightly more than half of all band returns were from Mexico where 14 (54 per cent) of the bands were recovered by Mexicans (Table 4). Most of the bands were taken from birds near the coast on the west side of Mexico. Although the returns are few, they probably point to some of the principal wintering grounds of the White Pelican. The remaining 46 per cent were recovered from the United States as follows: Utah, 4; Idaho, 7; and California, 1 recovery.

Analyzing by seasons the returns of the bands indicates that the juvenile pelicans fly northward into Idaho in the fall after leaving their nesting islands in Great Salt Lake. They probably fly south, however, prior to the freeze-up in the fall, since the majority of the banded pelicans was taken in Mexico the same year as banded (Table 3).

Sixty per cent of the returns were made the first season after banding; 24 per cent the second year; 12 per cent the fourth year, and 4 per cent the fifth year after banding (Table 3). More recoveries were made in the fall than in any other season of the year.

Recovery of the bands from White Pelicans is rather limited probably because most of the birds are taken by Mexicans. Although it is thought by some that the Mexicans take the pelicans for food, the majority of the recoveries have been from birds "found dead." Undoubtedly, some of the birds are eaten; others probably are victims of fishermen who believe the pelicans endanger their fishery resources. Recoveries in the United States were all from birds reportedly found dead.

TABLE 3  
BAND RECOVERIES OF WHITE PELICANS Banded ON GUNNISON ISLAND,  
GREAT SALT LAKE, UTAH

Area of recovery	Number bands returned	Season of recovery			Recoveries by years after banding			
		Spring and summer	Fall	Winter	First year	Second year	Fourth year	Fifth year
Utah	4	3	1		2	1		
Idaho	7	5	2		5		1	1
California	1		1		1			
Mexico	14	3	7	4	7	5	2	
Totals	26	11	11	4	15	6	3	1
Per cent of band recovery	4.3	42.3	42.3	15.4	60	24	12	4

#### HABITS OF THE WHITE PELICAN

The White Pelicans, nesting as they do on the islands in Great Salt Lake, must make a flight of 100 to 150 miles round trip to obtain the fish necessary to feed their young. Undoubtedly, some pelicans fly as far as 90 miles to Utah Lake, a former nesting site, to obtain food. Observations indicate that the pelicans now fish the man-made water areas constructed as migratory waterfowl refuges. This represents a shift from the pre-white-man days when Utah Lake is said to have been their principal source of food. Principal feeding grounds around the shores of Great Salt Lake are the shallow waters of Bear River Refuge, Locomotive Springs Refuge, Public Shooting Grounds Refuge, Ogden Bay Bird Refuge, Farmington Bay Bird Refuge, private gun clubs at the mouth of the Jordan River, and undoubtedly other small local water areas. The relation of some principal feeding areas to the nesting islands is shown in Figure 1.

Most feeding activities take place at night or early morning, although there have been notable exceptions to this. At these feeding times, large groups of pelicans, sometimes accompanied by lesser numbers of Brewster's Snowy Egrets, *Leucophoyx thula brewsteri*, and Double-

crested Cormorants, *Phalacrocorax a. auritus*, may be seen cruising around in close formation on the shallow water areas, evidently driving schools of fish ahead of them. Constant dipping of their heads beneath the water indicates when the pelicans are catching fish.

TABLE 4  
RETURNS FROM WHITE PELICANS Banded ON GUNNISON ISLAND,  
GREAT SALT LAKE, UTAH

Date banded	Date recovered	Place of recovery
July 12, 1938	November 23, 1938	Jalisco, Mexico
July 12, 1938	November 20, 1938	Valle de Mexico, Mexico
July 12, 1938	May 1, 1940	Guadalajara, Mexico
July 12, 1938	December 5, 1942	Sonora, Mexico
May 29, 1943	December 2, 1947	Mexico Culiancan, Mexico
June 23, 1943	July 4, 1948	Bear Lake, Idaho
June 23, 1943	June 28, 1944	Laguna de Chamilari, Sinaloa, Mexico
June 23, 1943	November 25, 1943	Excumiapa Sinaloa, Mexico
June 23, 1943	November 12, 1944	Pueblo Viejo Versacruz, Mexico
June 23, 1943	February 21, 1945	Maravatio, Mich., Mexico
July 3, 1946	December 21, 1946	Jalisco, Mexico
July 3, 1946	August 21, 1946	Terreton, Idaho
July 3, 1946	November 17, 1946	Minidoka, Idaho
July 3, 1946	December 8, 1946	Buena Vista Lake, Kern Co., California
July 3, 1946	September 15, 1946	Ashton, Idaho
July 3, 1946	October 28, 1946	American Falls, Idaho
July 3, 1946	April 9, 1947	Durango, Mexico
May 29, 1943	September 1947	Ogden Bay Bird Refuge
June 19, 1947	February 26, 1948	Santa Teresa, Mexico
July 15, 1948	September 5, 1948	Shore of Great Salt Lake
July 15, 1948	September 5, 1948	Mud Lake, Jefferson Co., Idaho
July 14, 1948	February 7, 1949	Juarez, 28, Veracruz
July 3, 1946	June 11, 1949	Gunnison Island, Great Salt Lake, Utah

Much difference of opinion has existed in regard to the economic value of the pelican, largely because of the bird's food habits. Early reports (Henshaw, 1879) indicated that the pelican was persecuted on its nesting grounds by people who believed the pelican took the prized game fish. Repeated personal observations, however, have shown that the pelican feeds almost exclusively on non-game fish. These "trash" fish, slow in motion and found in abundance in the large shallow water areas far from human disturbance, undoubtedly determine their selection as food by the pelicans. Examination of regurgitated food showed that the carp, *Cyprinus carpio*, was the most abundant fish species used as food. No trout were found in 123 regurgitated piles of food of young birds examined by Behle (1935). Suckers, *Catostomidae*, minnows, *Leucichthys* sp., Utah chub, *Gila atraria*, and catfish, *Ameiuridae*, have also been found in the diet of the pelican (Cottam, 1939).

After capturing the fish necessary for feeding the young, the pelicans make their way to the nesting sites on the island. A study was made

of the pelican's return flight to the nesting islands from the feeding grounds on the Bear River Refuge, the promontory range, mid-way to the islands, and at the nesting sites.

There is a regular morning flight of the birds from the Bear River Refuge almost exactly on a compass line with the location of Gunnison Island. The time and character of this flight varies with wind conditions. When the wind is from the north or northeast, the birds may be seen starting to the southwest in groups of a few to several hundred. They apparently make little or no effort to gain altitude immediately as they leave. Winds from the south, however, appear to be unfavorable, and the birds may be seen circling over the refuge and stringing out at various levels until they apparently find the most favorable wind. They then fly in a southwest direction from the refuge. On calm days the departure times are later and the procedure is different. The birds then form long lines, usually in single file and at about 50 feet in height, and fly west from the refuge. Once over the refuge dikes, they are above flats with alternating areas of *Scirpus paludosus* or *Salicornia rubra* and bare areas of white alkali soil. Here the birds begin to circle in wide arcs, soaring all the time. Sometimes they do this for short periods only and then string out again and proceed farther west toward promontory range (Fig. 1). Soon, however, it is noticed that in their soaring they have gained altitude and at the same time other groups of birds have flown to the same place and have begun to soar. The birds have been watched until they were at a height estimated as equal to the promontory range when they straightened out and flew to the southwest. At times, about 11:00 in the morning, a column of several of these groups may be seen to the west of the refuge. Aviators in the region have indicated that flats of alternating vegetation and bare white soil often have upward currents of air over them. It is believed that the birds may take advantage of these air currents to gain altitude in their flight from the feeding ground on Bear River Bird Refuge to their nesting sites on Gunnison Island.

From the east side of promontory range (Fig. 1) large groups of pelicans have been observed at about 11:00 a. m. flying to the range from the direction of the Bear River Refuge. Upon approaching the range, they circled and raised at the nose of a ridge running up from the lake shore. At the end of this ridge, they flew directly to another some two miles away and circled over it, rising all the time. This ridge ran to the crest of the main divide. After the birds appeared to be as high as the hills, they flew west again and disappeared over the divide. Observations made on the opposite side of the ridge showed that the pelicans flew directly west toward Gunnison Island, their nesting site.

At Gunnison Island, 260 groups of birds, counted June 23, 1937, showed the average flock to be 9.7 birds, while 122 flocks averaged 13 birds in 1948. One flock returning to the island in 1937 totaled 151 birds, while 66 was the largest flock counted in 1948. Single birds were observed approaching the island from the mainland. On both the above dates, the numbers of pelicans returning to the island from the direction of Bear River Refuge diminished towards afternoon. In 1937, the largest number returned to the island between 8:30 and 9:30 a. m.; in 1948, peak numbers were reached from 12 to 1:00 p. m. The flocks numbered over twice as many in 1937 as in 1948 and the count of returning adults in 1937 was 2518 compared to 1593 in 1948.

#### NESTING

The nests of the pelicans on Gunnison Island are in colonies of a few to several hundred. The nest is generally a raised pile of sticks, soil, and guano often several inches above the surrounding soil. Some nests which appear to be new are hollowed-out depressions.

As previously pointed out (Behle, 1943) the age of the young differed between the colonies of nests, but the young in individual colonies were approximately the same age. Thus, at the visit on June 19, 1947, there were eggs in some colonies, newly-hatched young in others, and young three-fourths grown in still other colonies. On July 15, 1948, there was only one colony with eggs; other colonies had hatched and the birds from some colonies were nearly full grown.

The differences in stages of reproduction indicate different starting dates, perhaps corresponding to the dates of arrival on the islands of the birds from the different colonies. Earliest nests, judging from the age of young at the time the island was visited, probably were started shortly after the first birds arrived. Dates of first arrivals at the Bear River Refuge differ by a few days through the years; the first arrivals have generally been recorded around March 20 each year (Table 5).

In 1947, a count of 254 nests showed 152 had either one egg or one young, and 102 nests had two eggs or young. Mortality in the nests and of adult birds undoubtedly is high. Gulls, *Larus californicus*, take both eggs and newly-hatched pelicans when the nest is left exposed. Sixty young and 15 adult pelicans were found dead in nine colonies in 1947. All loss of young birds was not found in this survey, since decomposition, predation and scavenging would eliminate some evidence of loss. In eight of the colonies, 65 nests had one egg unhatched (infertile or embryo dead), and in 26 nests two eggs had not hatched.

Some nesting colonies apparently have been in the same relative positions on the islands for many years. Different observers, however, have counted different numbers of nesting colonies. Kay (1935, *in litt*) recorded 16 colonies, while Behle (1943) listed 20 colonies; Low (1947, *in litt*) sketched and tallied 14 colonies on both sides of the island.

The oldest and largest young in the nest was repeatedly observed pecking and molesting its smaller nest mate. The largest young is able to consume more food and oftener, probably depriving the last-hatched young of its proportionate share. A majority of the dead birds observed were in nests where two birds had hatched and where one was still living.

TABLE 5  
DATES OF ARRIVAL AND DEPARTURE OF WHITE PELICANS AT BEAR RIVER  
BIRD REFUGE, UTAH

Year	Arrival date	Year	Arrival date	Departure date
1929	April 4	1940	March 19	
1930	March 28	1941	March 10	
1931	March 22	1942	March 20	December 19
1932	March 19	1943	March 25	December 6
1933	March 16	1944	March 9	November 16
1934	February 14	1945		December 4
1935	March 16	1946	March 21	October 30
1937	March 17	1947	March 11	December 2
		1948	March 8	November 10

Any disturbance of the pods of juvenile birds resulted in a sudden rush of the birds away from the danger. Smothering and trampling undoubtedly are mortality factors. Young, when frightened, may climb on rock ledges from which they fall or jump.

Older juveniles, when disturbed, run for the water. Thus, on July 15, 1948, the older young in four pods ran down the beaches of the island and into the water. The juveniles, however, returned to the island when the "danger" was gone.

Food is readily regurgitated by the disturbed young. Generally, the food, consisting wholly of fish, is in an advanced stage of digestion when regurgitated. Since this seems to be the case even when regurgitation takes place shortly after feeding it might indicate that the adult birds pre-digest the food to some extent.

Young pelicans would undoubtedly accept food if they had the opportunity, from any of the adult birds. The adults, however, appeared to be very particular as to the juveniles they fed.



#### NEED OF PROTECTION

On far-off isolated rocky island retreats, the White Pelican is safe from the everyday disturbances by man and beast. However, the invasion of their nesting grounds by man can raise havoc during the critical nesting and rearing period. Frightening of adult birds from their nests before hatching, generally the middle of June, gives an opportunity for the ever-present gulls to invade the nesting colonies and destroy both eggs and newly-hatched young. Disturbance later in the season, after July 1, when young are approaching maturity, may result in the young being driven from the island and lost "at sea." Rising water levels, though no fault of man, undoubtedly have driven birds from former nesting sites as in Utah Lake and, conversely, as at Bird Island, a lowering in the lake water connecting the island to the mainland has permitted land predators access to the birds.

The need for protection of the nesting rights of these birds is keenly felt. Exploitation of guano deposits at one time threatened the nesting site of these birds. If the use of the island in past years, as bombing and strafing range, has taken place during the period of nesting and rearing the young, the disturbance to the birds probably has been great. Such activities should be carried out during late fall and winter. Protection should be accorded the pelican in the Great Salt Lake Valley where it finds the enormous amounts of food necessary to sustain itself.

#### SUMMARY

1. Gunnison Island, in the northwest part of Great Salt Lake, Utah, was the locale for banding 600 juvenile White Pelicans during the 10-year period, 1938-1948.
2. Population estimates of pelicans breeding on Gunnison Island have varied through the years but there have probably been somewhere between 3000 and 6600 adult birds and from 2600 to 3300 nests.
3. A band return of 4.3 per cent was recorded; 60 per cent of those being returned the first year following the banding.
4. Fifty-four per cent of the band recoveries were from Mexico, with other returns from Utah, Idaho, and California.
5. The juvenile pelicans appear to fly north before going south for winter.
6. Food of the pelican is non-game fish taken largely from waterfowl refuges around the shore of Great Salt Lake.
7. As many as 20 separate nesting colonies on Gunnison Island have been counted.

8. Evidences have been found of mortality to juveniles from disturbances by man, gulls, and from strife among the young.

9. There is a special need of protection for the pelican on the nesting-ground islands in Great Salt Lake.

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## NOTES ON DETERMINATION OF SEX AND AGE IN THE WOODCOCK AND MOURNING DOVE

BY GEORGE A. PETRIDES

It is now well established that sex and age ratios are important in the study of population characteristics and fluctuations in animals. Attempts to establish sex criteria in the Woodcock, *Philohela minor*, and Mourning Dove, *Zenaidura macroura*, have been only partially successful, while age determination techniques are practically lacking.

The present study was largely incidental to similar investigations on other species made while the author was connected with the Ohio Co-operative Wildlife Research Unit, Ohio State University, Columbus, Ohio.

### WOODCOCK

Thirty skins were seen at the United States Fish and Wildlife Service collections in Washington and seven were borrowed from the Maine Cooperative Wildlife Unit. Though these were studied and compared, no external sex differences were found other than those described by Mendall and Aldous (1943). Similarly, no constant age differences could be found either in the plumages, X-ray films or skeletons of two juveniles and two fresh adult specimens collected in northwest Pennsylvania during November, 1947. The "jaw" test as applied to some gallinaceous species (Petrides, 1942; Linduska, 1945) was found to be of no value with these birds. Two juvenile females and one adult of each sex comprised the four specimens whose ages were determined by the presence or absence of the bursa of Fabricius.

The only age criterion found to be of value was the bursa of Fabricius, and this organ was more difficult to work with in the Woodcock than in the gallinaceous game birds. The bursae were clearly evident upon dissection in two birds, both females; they were absent in the other two specimens. The bursae seen were 14 and 16 millimeters long, respectively. They were imbedded in fat but were easily separated from it.

It was determined that, unlike the waterfowl, the Ring-necked Pheasant, *Phasianus colchicus*, and Ruffed Grouse, *Bonasa umbellus*, the bursa of the Woodcock has no opening into the cloaca. The bursa in young of the year was found to be large, with a central lumen that was macroscopically evident upon cross-sectioning. No canal through the dorsal wall of the cloaca could be located, even with a fine probe. Determining age by probing for the bursa through the vent as is so

commonly done in the Pheasant, therefore, apparently is impossible in the Woodcock.

#### MOURNING DOVE

The present investigation was on 65 birds made available by Dr. Lloyd G. Webb, formerly Research Fellow at the Ohio Cooperative Wildlife Research Unit. They were collected by him between May 23, 1947, and April 20, 1948, and included 41 males and 24 females. All had been labelled and frozen until early June, 1948, when they were examined. Sex differences in the plumage and sex and age differences in the cloacal region were studied.

While adult Mourning Doves of both sexes are very similar in appearance, some plumage differences seem to be recognizable. Pearson and Moore (1941) sexed 3491 doves in Alabama by both internal and external examination and state that "it was found impossible to accurately sex doves by external characters such as size and plumage." The present author studied a much smaller series of birds but found constant external differences between the sexes in these birds.

The most obvious points of distinction in the plumages of doves were in the color of the breast and crown of the head. As is commonly true among birds, the male dove has the more colorful plumage. The breast of the male is tinged with a faint but beautiful pink color which is absent from the plain brown breast of the female. The crown of the head in males, too, is a pronounced bluish-gray. In females, the top of the head is brown, like the sides of the head. These sex differences are noted in a number of standard ornithological works (see Chapman, 1934).

No errors were made in checking 51 birds in adult plumage when sex was determined first by plumage color and then by dissection. With a small collection of accurately sexed study skins at hand, there would seem to be no reason why live-trapped birds, at least, could not be rather accurately sexed by plumage characteristics.

Sexing juvenile birds by the incoming post-juvenile plumage was found to be more difficult. The plain, brown, contour feathers of the breasts of females contrasted so strongly with the more dull, juvenile plumage that several female specimens were misidentified as males. None of the birds of this juvenile series was dissected, however, until after judgment of the sex of all was attempted by plumage characteristics. Accurately sexed study skins of specimens in advanced stages of the post-juvenile molt would have been helpful for comparison.

No investigation of age criteria in the plumage was attempted in this study, but see Pearson and Moore (1940).

With Hochbaum's (1942) methods of determining sex and age in waterfowl in mind, cloacal examination of dead Mourning Doves was attempted. It was thought that, while the penis would not be evident in males, the presence or absence of openings of the oviduct and bursa of Fabricius might indicate sex and age, respectively. Though use of an otoscope (the lens-equipped, flashlight-like device used by physicians to examine the interior of human ears) was attempted, direct examination proved much more helpful. The sphincter muscles encircling the vent were relaxed by stretching, whereupon the interior of the cloaca in these dead birds was easily visible.

It was found that the oviducal opening was easily located in adult females but could not be discerned in younger birds. Presumably, sexual maturity or even the passage of eggs is required to enlarge the opening to readily visible proportions. In 11 females in which the bursa was absent, the oviducal opening was evident, ranging from two to seven millimeters in diameter when relaxed. In one of these 11, the opening was overlooked on the first examination. In a twelfth female, presumably an adult, no oviducal opening could be found even after a thorough search. The opening seemed to be occluded by a thin membrane. The ovary and oviduct of this specimen, taken on July 16, were maturely developed otherwise. In five juveniles, no such opening could be found. Winter females were scarce in the collection; none was collected between early September and February 28. The only one suitable for study was taken on the latter date at which time it lacked both a bursa and an oviducal opening. It is not known whether oviducal openings become reduced in size in adult females during the non-breeding season. If further evidence indicates that the opening of the oviduct is not visible in some females, then, of course, it is evident that this structure can serve in only a limited way in sex determination. At least during the breeding season, however, sex studies of live, nesting doves possibly may be aided by cloacal examination following the application of a 10% cocaine solution (Hochbaum, 1942) or other anesthetic to the vent.

Study of the bursa in the Mourning Dove revealed that, like the Woodcock but unlike the waterfowl and at least some gallinaceous game birds, there is in the dorsal wall of the cloaca no opening leading into the lumen of the bursa. The only apparent method of determining the presence of the bursa was dissection. Often, too, the bursa was found to be imbedded so deeply in fat that a careful search for it had to be made along the dorsal wall of the cloaca and within the body cavity.

The several bursae seen measured up to eight millimeters long by

seven millimeters in diameter at the base. The latest occurrence of a bursa in the birds studied was in a male collected on December 10 when it apparently had a complete first-winter plumage. This bursa measured seven millimeters long by five millimeters wide at the base. In the only January specimen which had remained well-preserved, the bursa was absent.

Where doves must be rapidly checked for age in the field, the size and development of the sex organs alone may serve as a convenient source of sex and age information without resorting to dissection of the bursa. The enlarged testes and ovaries of adults were in invariable contrast to the undeveloped sex organs of juveniles in the Ohio birds examined. Whether this method is useful in southern areas is not known.

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*Texas Cooperative Wildlife Unit, Texas A. and M. College, College Station, Texas, June 20, 1949.*



*LUSCINIA MEGARHYNCHOS* BREHM IN THE WESTERN  
PALAEARCTIC REGION, AND A NEW RACE FROM  
THE BRITISH ISLES

BY PHILLIP A. CLANCEY AND ADOLPH VON JORDANS

In the past, the majority of Palaearctic workers have been content to treat the European and North African populations of the Old World Nightingale as of one race, namely, *Luscinia megarhynchos megarhynchos* Brehm, 1831, from Germany, but that other races are separable has been shown by Parrot and over many years by von Jordans. As a result of researches recently carried out, we are now of the opinion that at least four races, including the typical one, are recognizable in Europe and North Africa.

Dr. J. M. Harrison (Ibis, 1933: 594) has alluded to the fact that British breeding examples of *L. megarhynchos* differ from those from Bulgaria in that they are not so pale and grayish on the backs nor so white on the ventral surfaces. We have investigated further the differences noted by Harrison with a series amassed for the purpose in Suffolk. We find that if British breeding birds are compared with exact topotypical material of *L. m. megarhynchos* the differences are even more prominent than when they are laid alongside Balkan examples.

In the series, British breeding *L. megarhynchos* are of a noticeably duller and less rufous shade of brown on the upperparts, wings and tails, and on the undersides the breasts and flanks are duller and more grayish than certainly ever seems to be so in the true German bird. We now consider it advisable to differentiate these occidental *L. megarhynchos* populations from Great Britain as a new race, and in recognition of their dull coloration we designate it,

*Luscinia megarhynchos caligiformis*, new subspecies

TYPE: Male, adult, breeding. Martlesham, Woodbridge, East Suffolk, south-eastern England. May 4, 1941. In the Clancey collection. CO-TYPE: Male, adult, breeding. Martlesham, Woodbridge, East Suffolk, south-eastern England. June 11, 1941. In the collection of the Museum Alexander Koenig, Bonn, Germany.

DISTRIBUTION: Confined as a regular breeding bird to England south of a line from Wash to Severn. North and west of the Wash-Severn line it rapidly decreases in numbers and is not known as a breeding bird from northern England, Scotland or Ireland. Winter quarters in tropical Africa are not at present known.

NOTE: The populations found in north-western France, Belgium, and

Holland, require further study to ascertain their affinities. It should be appreciated by those who study *L. megarhynchos* that series of breeding birds are seldom uniform owing to the differing stages of wear. Some examples arrive on the breeding grounds at the end of April in considerably abraded dress, and they appear paler than those in which the plumage is not worn to any palpable degree.

*Luscinia megarhynchos luscinioides* von Jordans (Falco, 1923, Sonderheft: 3) was founded on a breeding series of 26 skins, mostly taken on a second collecting trip to the Balearic Islands by von Jordans. The criteria used largely in the 1923 separation of *L. m. luscinioides* had already been discussed in 'Die Vogelfauna Mallorcas,' published in 1914. Further information in support of the recognition of this race of the Nightingale is given in Journ. für Orn., 1924:162-163, and Nov. Zool., 1928: 282. Hartert and Steinbacher (Vög. Pal. Fauna, Ergänz., 1935: 325) after comparing part of the paratypical series arrived at the conclusion that the differences claimed for the race were insufficient to support its recognition. With this finding we cannot agree. With the very adequate series of *L. megarhynchos* races preserved in the collection of the Museum Alexander Koenig, Bonn, at our disposal, it has been possible to go into the whole question of the validity of *L. m. luscinioides* once again, and our findings fully substantiate the naming of the Balearic Islands populations.

In *L. m. luscinioides* the wing-formula is as in the Thrush Nightingale, *Luscinia luscinia* (Linnaeus), and the upper-parts have the reddish-brown tones of the typical race replaced by dark grayish-brown coloration, much as in *L. luscinia*. The tail is also darker and less reddish-brown than that of *L. m. megarhynchos*. The song of *L. m. luscinioides* differs from that of the typical race—a fact to which Brehm years ago drew attention in respect of the neighboring Spanish populations. Very exhaustive details in support of this form have already been given, supported by diagrams, by von Jordans (see in particular, Nov. Zool., 1928) and it would be pointless to add further to these. We propose, therefore, to recognize *L. m. luscinioides* on account of its distinctive morphological criteria, and on biological and geographical grounds.

Of *Luscinia megarhynchos corsa* Parrot, 1910, from Ajaccio, Corsica, we can add little that is new, but would remark that on the basis of the material available to us it certainly seems to be a maintainable race. It is recognized by Hartert (Vög. Pal. Fauna, 3: 2167, 1922). Further study of the *L. megarhynchos* populations of the Mediterranean Basin is clearly required. The summarized characters and distributions of the four races dealt with are as follows:

1. *Luscinia megarhynchos megarhynchos* Brehm, 1831: Germany. Upper-parts, wings and tail, red-brown. Under-parts dull white, shaded dusky on breast and flanks. Wing: 82-87 mm. (mostly ex Neithammer and Stresemann).

*Distribution*: Germany (except Baltic coast), Poland (west of Vistula), south-western Russia, Rumania, Czechoslovakia, Hungary, Austria, Switzerland, Holland, Belgium, France, (?) southern Spain, Portugal, Italy, Sicily, Sardinia, Balkans, Crete, Cyprus, Asia Minor, western Transcaucasia. (?) Also in North Africa from Morocco to Cyrenaica.

2. *Luscinia megarhynchos caligiformis* Clancey and von Jordans, new subspecies. Like *L. m. megarhynchos*, but darker, less rufous, above and on wings and tail. Darker on breast and flanks. Wing: 81-88 mm.

*Distribution*: England—see fuller details given above.

3. *Luscinia megarhynchos corsa* Parrot, 1910: Corsica. Darker red-brown on upper-parts than *L. m. megarhynchos* and smaller in size. Wing: 79-84 mm.

*Distribution*: Corsica.

4. *Luscinia megarhynchos luscinioides* von Jordans, 1923: Balearic Islands. Upper-parts darker grey-brown than in *L. m. megarhynchos* and tail less rufous. Wing-formula as in *L. luscinia*. Wing: 80-87 mm.

*Distribution*: Balearic Islands. (?) Parts of southern Spain.

We gratefully acknowledge information received from Dr. J. M. Harrison, D.S.C., Sevenoaks, Kent, in connection with our investigations.

♂ Craig Road, Cathcart, Glasgow S. 4., Scotland, and Museum Alexander Koenig, Bonn, Germany, July 27, 1949.

## SOME NOTES ON PANAMÁ BIRDS COLLECTED BY J. H. BATTY

BY EUGENE EISENMANN

AMONG the birds acquired by the American Museum of Natural History from the Rothschild Museum was a large collection made by J. H. Batty in 1901 and 1902 in western Panamá. Batty's collection has never been reported upon, except for description of a few endemic forms from the somewhat isolated and mountainous Coiba Island. Further examination of Batty's specimens reveals data of distributional and taxonomic interest.

### MOUNTAIN BIRDS IN THE LOWLANDS

In January and February, 1902, Batty visited the small, low islands off the Pacific coast of Chiriquí and Veraguas provinces, which have been worked by no one else. In addition to the usual lowland species, Batty collected a surprising variety of what have generally been regarded as exclusively mountain birds (Griscom, 1935). Since January and February are dry season months, the possibility of a seasonal altitudinal movement is suggested. While there is little temperature variation in Panamá, the prevailing northeast trade winds at this season have a marked desiccating effect on vegetation, particularly on the southwestern slopes. Migration, in the sense of a periodic shifting of entire populations, is not probable, but a descent from the mountains of many individuals may occur.

Little is known about altitudinal movements of neotropical birds. In nearby Costa Rica, Carriker (1910: 326) found that some mountain species periodically appeared at the lower levels when certain fruit ripened. In Colombia, Chapman "obtained no evidence of altitudinal migration" (1917: 88); but, more recently, de Schauensee (1948: 264) reported a few species which, occasionally at least, occur outside their altitudinal zone. Other western Panamá collectors, working chiefly inland, have taken a few such specimens, but nothing resembling the variety collected by Batty. Perhaps some of these forms have a more extensive altitudinal range than has been supposed; perhaps these coastal islands act as a trap for wanderers that can go no farther.

Of the islands mentioned below, Brava, Burica, Parida, Sevilla and Insoleta are off the coast of Chiriquí, the last near the Veraguas border. Cebaco, Gobernador, Afuera and Jicarón islands are off the coast of Veraguas. All are near the mainland (some less than a mile away), except Jicarón Island about 35 miles distant, between which

and the coast there is interposed the large Coiba Island. None of these islands is separated from the mainland by any continuous water gap exceeding five miles; the mountains are from 30 to 80 miles away.

The birds listed were all collected in 1902 by Batty, unless otherwise stated. A few records by others of mountain birds in the lowlands of western Panamá are also given.

*Buteo jamaicensis costaricensis*.—Parida I., Jan. 18; Brava I., Jan. 28; both immature. Peters (1931: 310) mentions an immature taken on the Caribbean slope at Changuinola, Bocas del Toro, Dec. 9, 1928.

*Leucopternis p. princeps*.—Cebaco I., Feb. 6.

*Eupherusa eximia egregia*.—Bogava, Chiriquí, Oct. 7, 1905 (H. J. Watson, in Amer. Mus. Nat. Hist.).

*Elvira chionura*.—Gobernador I., Jan. 11, 12, 13; Cebaco I., Feb. 7.

*Lampornis c. castaneoventris*.—Cebaco I., Feb. 1, adult male.

*Selasphorus scintilla*.—Cebaco I., Feb. 1; Gobernador I., Jan. 12, 13.

*Trogon collaris puella*.—Gobernador I., Jan. 12.

*Trogon a. aurantiiventris*.—Brava I., Jan. 26; Sevilla I., Jan. 28; Insoleta I., Jan. 2; Gobernador I., Jan. 13. (Specimens from the last two islands may possibly be *flavidior*.)

*Momotus momota lessonii*.—Sevilla I., Jan. 21, 23; Brava I. (4 spec.), Jan. 27; Afuera I., Jan. 10; Gobernador I. (3 spec.), Jan. 12; Cebaco I., Feb. 7. As there are numerous other examples taken in the lowlands of Chiriquí and Veraguas from at least September through March, Aldrich (1937: 77) may be correct in his suggestion that this is not exclusively a mountain form.

*Aulacorhynchus caeruleogularis maxillaris*.—Brava I., Jan. 28, 29, 30.

*Aulacorhynchus c. caeruleogularis*.—Cebaco I. (5 spec.), Feb. 4, 5, 6.

*Picus rubiginosus uropygialis*.—Sevilla I., Jan. 24; Afuera I., Jan. 10.

*Balanophyia formicivora striatipictus*.—Sevilla I., Jan. 22, 28; Burica I., Feb. 4.

*Procnias tricarunculata*.—Gobernador I., Jan. 12; Cebaco I. (9 spec.), Feb. 1-7. There are many other lowland records—in Chiriquí: Divala, Oct.-Dec. 1900 (34 spec.; Bangs, 1901: 365); on the Caribbean coast of Bocas del Toro at Changuinola, Aug. 13, 1927, and Almirante, March 2, 1926, Dec. 17, 18, 1928 (Kennard and Peters, 1928: 458; and Peters, 1931: 329). Carriker (1910: 326) has remarked on the altitudinal movement of this species in Costa Rica.

*Myadestes melanops*.—Cebaco I., Feb. 6.

*Turdus assimilis cnephosus*.—Cebaco I., Feb. 4.

*Catharus aurantirostris griseiceps*.—Cebaco I., Feb. 5; Afuera I., Jan. 10.

*Vireo leucophrys chiriquiensis*.—Sevilla I., Jan. 20.

*Vermivora gutturalis*.—Brava I. (3 spec.), Jan. 27, 30; Cebaco I., Feb. 7; (not otherwise known south or east of the Chiriquí mountains).

*Parula pitaiayumi inornata*.—Brava I., Jan. 28.

*Myioborus miniatus aurantiacus*.—Brava I., Jan. 27, 28, 30; Cebaco I., Feb. 2, 3, 5; Boqueron, Chiriquí, Dec. 2, 1901.

*Basileuterus melanogenys eximius*.—Cebaco I., Feb. 2 (male, definitely not *bensoni* of the mountains of eastern Veraguas, but rather the Chiriquí mountain form).

*Tangara icterocephala*.—Cebaco I., Feb. 6.

*Piranga leucoptera latifasciata*.—Jicaron I., Jan. 14.

*Piranga bidentata citrea*.—Brava I. (6 spec.), Jan. 27, 28; Jicaron I., Jan. 15.

*Buarremon b. brunneinuchus*.—Sevilla I., Jan. 12, 21, 24; Bogava, Chiriquí, Nov. 7, 1907 (H. J. Watson in Amer. Mus. Nat. Hist.).

Another possible wanderer from the mainland is an example of *Cyclarhis gujanensis subflavescens* taken by Batty on Jicarón Island on January 14. This specimen is very different from *C. g. coibae* of nearby Coiba Island, but seems inseparable from Chiriquí highland birds.

#### A NEW RACE OF *Turdus assimilis*:

##### *Turdus assimilis coibensis* new subspecies

TYPE: Adult female, Amer. Mus. Nat. Hist. no. 503415 (ex Rothschild Mus.); Coiba Island, Veraguas, Panamá; April 20, 1901; J. H. Batty, collector.

DIAGNOSIS: Closest to *daguae* Berlepsch of tropical western Colombia, northwestern Ecuador and Darien, but bill longer, underparts more buffy (less grayish), the color extending over entire abdomen; under tail-coverts with broad fuscous margins, instead of being largely or immaculately white. Differs from *cnephosus* (Bangs) of the mountains of western Panamá and southwestern Costa Rica in blackish bill, much ruddier color above and below, broad fuscous margins to the under tail-coverts, and smaller size.

MEASUREMENTS: Type: wing (flat) 109 mm.; tail, 77; bill (chord of culmen) 21.5. Male (Amer. Mus. Nat. Hist. no. 503414, Coiba I., April 17, 1901, coll. Batty): wing, 110; tail, 83; bill injured (chord of gonys, 13.5).

RANGE: Coiba Island, Veraguas, Panamá.

MATERIAL EXAMINED: *T. a. cnephosus*: PANAMÁ, 2 males, 5 females (Chiriquí and Veraguas); COSTA RICA, 3 males. *T. a. daguae*: COLOMBIA, 4 males, 3 females; ECUADOR, 3 males, 3 females; PANAMÁ, 9 (Darien; in U. S. Nat. Mus., examined only for color). *T. a. coibensis*: COIBA ISLAND, 1 male, 1 female.

REMARKS: Although only two specimens are known, the birds are so distinct from *cnephosus*, the geographically nearest ally, and so strongly approach the distant *daguae*, often considered a distinct species, that there can be no doubt we have here another form endemic to Coiba Island. Batty collected a typical specimen of *cnephosus* (Amer. Mus. Nat. Hist. no. 503413) on Cebaco Island, Veraguas, some 30 miles east of Coiba Island and thus nearer to the range of *daguae*; but that specimen, taken on February 4, 1902, is doubtless a visitant from the mainland mountains.

In back color the type of the new form, a female, is slightly less ruddy (more olivaceous) than females of *daguae*, though the male specimen does not differ appreciably above from males of *daguae*.



The bill is intermediate between *daguae* and *cnephosus*, having the dusky color of the former and the larger size of the latter; *cnephosus* (Costa Rica and Panamá) bill, 5 males, 17.5–19.5 mm. and 5 females, 18.5–20; *daguae* (Colombia and Ecuador) bill, 7 males, 15.5–18.5 and 7 females, 16.5–19.5. Though the maxilla of the male is damaged, the mandible (gonys) of this specimen (13.5) and of the type (14) is actually longer than that of any of the measured specimens of *cnephosus* (12–13) or of *daguae* (10–12.5 mm.).

The intermediate character of some features of the new form tends to support Hellmayr's opinion (1934: 365) that *daguae* should be treated as conspecific with *cnephosus* and that both are part of the *T. assimilis* complex (cf. Miller and Griscom, 1925: 16).

#### ACKNOWLEDGMENTS

I am indebted to the authorities of the American Museum for the privilege of examining specimens in its great neotropical collection, particularly to Dr. J. T. Zimmer who kindly read the manuscript, and to Dr. Dean Amadon, who generously gave me advice and assistance of all kinds, including the measuring of specimens. I am also obligated to Dr. Herbert Friedmann for making available birds in the National Museum and to Dr. Alexander Wetmore for helpful criticism.

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*Linnaean Society of New York, New York, December 5, 1949.*

# TWENTY-FIFTH SUPPLEMENT TO THE AMERICAN ORNITHOLOGISTS' UNION CHECK-LIST OF NORTH AMERICAN BIRDS<sup>1</sup>

THE supplement presented herewith covers proposals for change in name or status, or for addition, that have been accepted by the Committee to the end of the year 1949. The complete revision for the fifth edition of the Check-List, under which all ranges are being completely rewritten, continues, the work at the moment being well along in the Order Passeriformes.

The untimely death of Adriaan J. van Rossem, member of the present Committee since its formation and active in the prosecution of its work, is recorded here by his fellow members in tribute to his memory, and to his ability in our science of ornithology.

## Committee

ALEXANDER WETMORE, Chairman  
HERBERT FRIEDMANN, Vice-Chairman  
FREDERICK C. LINCOLN  
ALDEN H. MILLER  
JAMES L. PETERS  
JOSSELYN VAN TYNE  
JOHN T. ZIMMER

## Page

8. *Puffinus opisthomelas* becomes *Puffinus puffinus opisthomelas*, as it is considered a geographic race of the Manx Shearwater. See Hellmayr and Conover, Cat. Birds Amer., Field Mus. Nat. Hist., Zool. Ser., vol. 13, pt. 1, no. 2, 1948, pp. 70-71.
41. *Chen rossii* becomes *Chen rossii* to conform with the original spelling.
47. *Anas crecca* becomes *Anas crecca crecca* because of the additional subspecies *Anas crecca nimia*, added to the Check-List in the Twenty-fourth Supplement, Auk, vol. 66, no. 3, July, 1949, p. 282.
51. The GREATER SCAUP DUCK, listed in the Twentieth Supplement, Auk, vol. 62, no. 3, July, 1945, p. 438, as *Aythya marila* (Linnaeus), should be *Aythya marila nearctica* Stejneger. See Nineteenth Supplement, Auk, vol. 61, no. 3, July, 1944, p. 444.
52. *Aythya baeri* (Radde). BAER'S POCHARD. [149.2.] *Anas (Fuligula) Baeri* Radde, Reise Süd von Ost-Sibirien, vol. 2, 1863, p. 376, pl. 15. (Upper Salbatch Plains, middle Amur River.) Additional species. Recorded from "Oregon" by Friedmann, Condor, vol. 51, no. 1, February 2, 1949, pp. 43-44.
66. *Buteo jamaicensis krideri* becomes *Buteo jamaicensis kriderii* to conform with the original spelling.
70. *Buteo nitida maxima* listed in the Nineteenth Supplement, Auk, vol. 61, no. 3, July, 1944, p. 445, becomes *Buteo nitidus maximus*, to agree in gender with the generic name.

<sup>1</sup>The Twenty-fourth Supplement was published in The Auk, vol. 66, no. 3, July, 1949, pp. 281-285.

71. The genus *Thalassoaëtus* is united with *Haliaeetus*, so that the former *Thalassoaëtus pelagicus* (Pallas) becomes *Haliaeetus pelagicus* (Pallas). See Hellmayr and Conover, Cat. Birds Amer., Field Mus. Nat. Hist., Zool. Ser., vol. 13, pt. 1, no. 4, 1949, pp. 215, 218.
73. *Polyborus Vieillot*, 1816, is found to be a synonym of *Circus Lacépède*, 1799. The next available name is *Caracara Merrem*, in Ersch and Gruber, Allg. Encycl. Wiss. Künste, vol. 15, 1826, p. 159. Type, by subsequent designation, *Falco plancus* Miller (Hellmayr and Conover, 1949). The forms will stand as follows (the subspecific name *audubonii* being corrected from *auduboni* to conform with the original spelling):  
*Caracara cheriway audubonii* (Cassin).  
*Caracara lutosus* (Ridgway).  
The subfamily *Polyborinae* becomes *Caracarinae*.
90. *Lophortyx californica decolorata* included in the Twenty-second Supplement, Auk, vol. 64, no. 3, July, 1947, p. 447, should be numbered 294 f instead of 294 g. Through an oversight *Lophortyx californica plumbea*, already in the Check-List with the number 294 c, was listed in the same supplement again as an additional subspecies with the number 294 f.
201. *Platyptaris aglaiae gravis* van Rossem. NORTHEASTERN ROSE-THROATED BECARD. [441.1a.] *Platyptaris aglaiae gravis* van Rossem, Condor, vol. 40, no. 6, November 15, 1938, p. 262. (Alta Mira, Tamaulipas.) Additional subspecies. Northeastern México, north to Hidalgo County, Texas. See Sutton, Auk, vol. 66, no. 4, Oct., 1949, pp. 365-366.
216. The number for the KAMCHATKA BANK SWALLOW, *Riparia riparia ijimae* (Lönnerberg), added in the Twentieth Supplement, Auk, vol. 61, no. 3, July, 1945, p. 444, should read 616 a, not 166 a.
242. The number for *Troglodytes aedon baldwini*, added in the Nineteenth Supplement, Auk, vol. 61, no. 3, July, 1944, p. 455, should read 721 b, not 722 b.
242. *Troglodytes brunneicollis vorhiesi* Brandt. APACHE BROWN-THROATED WREN. [721.1.] *Troglodytes brunneicollis vorhiesi* Brandt, Auk, vol. 62, no. 4, October, 1945, p. 576. (Pat Scott Canyon, altitude 7200 feet, Huachuca Mountains, Cochise County, Arizona.) Additional species and subspecies. Chiricahua, Huachuca, and Rincon Mountains in southern Arizona.
256. The number for *Turdus migratorius nigriceus*, added in the Nineteenth Supplement, Auk, vol. 61, no. 3, July, 1944, p. 457, should read 761 d, not 716 d.
261. The number for *Sialia sialis grata*, added in the Nineteenth Supplement, Auk, vol. 61, no. 3, July, 1944, p. 457, should read 766 b, not 766 d.
- 262-263. The names *Cyanosylvia Brehm*, 1828, and *Calliope Gould*, 1836, are replaced by *Luscinia Forster* 1817, as these three groups are considered congeneric. See Hartert, Vög. pal. Fauna, vol. 1, pt. 6, 1910, pp. 732-733, and Witherby, Jourdain, Ticehurst and Tucker, Handb. Brit. Birds, vol. 2, 1938, pp. 187, 193, 199.  
*Luscinia Forster*, Syn. Cat. Brit. Birds, 1817, p. 14. Type, by monotypy, "*Sylvia luscinia*" = *Luscinia megarhynchos* Brehm.  
The forms included under *Luscinia* therefore will stand as follows:  
*Luscinia svecica robusta* (Buturlin).  
*Luscinia calliope camtschatkensis* (Gmelin).
264. The genus *Acanthopneuste* Blasius, 1858, is replaced by *Phylloscopus Boie*, 1826, since these two are considered inseparable. See Steinbacher, Vög. pal. Fauna, Ergänzungs., heft. 3, 1934, p. 239.

*Phylloscopus* Boie, *Isis von Oken*, vol. 19, pt. 10, 1826, col. 972. Type by monotypy, "*Syl. trochilus* Lath." = *Sylvia trochilus* Linnaeus.

The included forms will stand as follows:

*Phylloscopus borealis hennicotti* (Baird).

*Phylloscopus trochilus acredula* (Linnaeus).

#### FOSSIL LIST

433. The genus *Urubitinga* Lafresnaye becomes *Hypomorphnus* Cabanis, *Arch. für Naturg.*, vol. 10, pt. 1, 1844, p. 263. Type, by original designation, *Falco urubitinga* Linnaeus. See Peters, *Check-list Birds World*, vol. 1, 1931, p. 244. The species listed in the A. O. U. Check-List, p. 433, becomes *Hypomorphnus enecta* (Wetmore).

## STABILITY IN ZOOLOGICAL NOMENCLATURE

BY FRANCIS HEMMING\*

IN his recent paper 'Birds collected during Captain James Cook's Last Expedition (1776-1780)' (*Auk*, 67: 66-88, 1950) Dr. Erwin Stresemann identified a number of previously unrecognized species of birds described and named by Gmelin in 1788 and pointed out that under a strict application of the Law of Priority these identifications would involve the substitution of unknown Gmelin names for nine species and six subspecies of birds, the currently accepted names for which have been in use, "mostly unchallenged" for, in many cases, over 100 years. In submitting these conclusions, Dr. Stresemann expressed the view (p. 87) that some determined step should be taken to prevent well-known and long-established names of this kind from being overthrown for purely technical nomenclatorial reasons. Dr. Stresemann stated that he would be only too glad if some legal way could be found to lock up what he terms his "excavated antiques" in a museum's drawer. He accordingly suggested that these 15 cases should be examined by some International Committee of nomenclature.

Dr. Stresemann's suggestion prompts me, as Secretary to the International Commission on Zoological Nomenclature, to recall that for many years there has existed precisely the kind of international machinery that he has in mind, for as long ago as 1913 the International Congress of Zoology conferred upon the International Commission on Zoological Nomenclature plenary powers to suspend the normal operation of the rules in the International Code of Zoological Nomenclature in cases where the Commission is satisfied that the strict application of the Code would lead to greater confusion than uniformity. At the same time the Congress also established an 'Official List of Generic Names in Zoology' for the purpose of stabilizing the position of well-known generic names. In a number of important cases use

\* Secretary, International Commission on Zoological Nomenclature.

has been made of the foregoing provisions and stability has thus been secured for the names in question. Nevertheless, a great deal of name-changing continued during the inter-war years, a process which, as Dr. Stresemann observes and is evident from the correspondence reaching the Commission from many sources, has led to an ever-growing demand, both from systematists and from workers in the applied biological fields, that more effective means should be found to secure stability in zoological nomenclature. The whole question was considered with great care both by the International Commission and also by the International Congress of Zoology at their joint meeting held in Paris in July, 1948.

On the general question the Congress took the view that it was important that whatever solution might be adopted should be one which, prior to its adoption, had been widely canvassed among representative groups of specialists in the various groups of the Animal Kingdom, in order that the measures to be adopted should be such as to command the widest possible support from the general body of zoologists. On the other hand, the Congress considered that this question was of such importance and urgency that definite decisions thereon should be taken at the next meeting of the Congress, which is due to be held at Copenhagen in 1953. The Congress accordingly instructed me to take steps during the intervening period to ascertain the views of representative groups of zoologists with a view to the submission to the Congress at its next meeting of a scheme that would be generally acceptable. In pursuance of the duty so entrusted to me, I am, therefore, most anxious to receive expressions of opinion and suggestions on this subject from scientific institutions, learned societies, and individual zoologists.

The International Congress at Paris (and the International Commission as its adviser on questions of nomenclature) felt, however, that there were certain directions in which existing machinery could and should at once be improved. The Congress accordingly decided to add to the 'Official List of Generic Names in Zoology' a corresponding 'Official List of Specific Trivial Names in Zoology,' in order that a start might be made without further delay in building up a list of names of species (and subspecies) that were officially recognized and were not to be changed without prior reference to the International Commission on Zoological Nomenclature. At the same time the Congress established "Official Indexes" for the recording, respectively, of rejected and invalid generic and specific trivial names, it being unanimously agreed that "Official Indexes" of this kind formed an indispensable counterpart to the "Official Lists" of valid names. In reach-

ing these decisions, the Congress expressly instructed the International Commission to take every step in its power to foster the development of these "Official Lists" and "Official Indexes." The Commission is accordingly anxious to receive applications on this subject. A note has been prepared giving full particulars of the bibliographical and other data which should be included in such applications, copies of which are available to any specialists contemplating the preparation of applications of this kind.

The mechanism described above is well calculated to secure stability for names which are valid under the Code or which are currently believed to be so, for, under a decision taken by the Paris Congress a name once placed on either of the "Official Lists" is not to be discarded in favor of some other name even if later it is found that under the Law of Priority it is not the oldest available name for the genus or species concerned, unless and until the Commission, on having the relevant considerations placed before it, so directs. It may be expected therefore that, as the number of names stabilized in this way increases, these "Official Lists" will play an increasingly important role in preventing well-known names from being changed or used in some sense other than that commonly accepted, as the result of further examination of the older and still imperfectly understood zoological literature. There remains, however, the class of case referred to by Dr. Stresemann where a well-established name, that has not been stabilized through being placed on the appropriate "Official List" is found to be invalid as a junior synonym (or in some cases as a junior homonym). For such names availability and, consequently, stability can be secured only by the use by the Commission of its plenary powers. The Paris Congress recognized, however, that there is a danger that, once a name, however well known, is shown to be invalid, specialists will normally tend to abandon the use of that name, believing that by so doing they are promoting ultimate stability in the nomenclature in their respective groups. In order to ward against this danger and to prevent the position in any given case from being prejudiced pending the consideration of the whole matter by the International Commission, the Paris Congress decided to insert in Article 25 (Law of Priority) of the Code a *Recommendation* urging authors, on discovering that a well-known name is invalid or, in the case of a generic name, that the type species is some species other than that commonly accepted as such, at once to bring the facts to the notice of the International Commission and, pending a decision by the Commission, to refrain from changing existing nomenclatorial practice in the case concerned.

When at Monaco in 1913 the International Congress of Zoology



decided to confer upon the International Commission plenary powers to vary the application of individual provisions in the Code for the purpose of avoiding confusion and promoting stability, that decision was taken in the form of a resolution adopted by the Congress in Plenary Session. The fact that this procedure was adopted rather than the insertion of a new Article in the Code dealing with this matter is, however, purely formal, being a distinction without a difference, for both the Code itself and the Plenary Powers Resolution of 1913 draw their authority from an identical source, namely a decision taken by the Congress in Plenary Session. Nevertheless, the view was advanced in Paris that one of the reasons why a larger number of applications for the use of the plenary powers had not been submitted to the International Commission was that some zoologists, though sincerely anxious to promote stability in the nomenclature of their special groups, had been deterred from making application for the use of the plenary powers for this purpose in the mistaken belief that the status of the Plenary Powers Resolution of 1913 was in some way inferior to the status enjoyed by the Code itself and, therefore, that each successive use of the plenary powers tended to undermine the authority of the Code as a whole. In order to remove this stumbling-block, in so far as it had operated to restrict the submission of applications for the use of the plenary powers, the Paris Congress (acting on the advice of the Commission) decided to adopt two measures, each designed to emphasize the identity of status of the provisions relating to the plenary powers on the one hand and, on the other hand, the provisions already incorporated in Articles in the Code. The Congress accordingly decided: (1) to insert in the Code a new Article embodying (in a slightly amended form) the provisions relating to the plenary powers which had hitherto been recorded only in the Resolution adopted by the Congress in 1913; and (2) to attach to the Code as a Schedule a list of all the individual decisions taken (or hereafter to be taken) by the Commission under the plenary powers. In future, therefore, it will be absolutely clear that the provisions relating to the plenary powers are as much a part of the Code as any of its other provisions.

Full particulars of all the decisions in regard to zoological nomenclature taken by the Paris Congress, on the advice of the Commission, will be found in the Official Record of the Proceedings of the International Commission on Zoological Nomenclature at its Session of Meetings held in Paris in July, 1948, which is now in press and will shortly be published as volume 4 of the Commission's *Bulletin of Zoological Nomenclature*. The purpose of the present note is merely

to draw attention to those of the decisions of the Congress which are specially concerned with the problem of promoting stability in zoological nomenclature. It will be seen from the particulars so given that the Congress was deeply impressed with the importance and urgency of the present problem but that at the same time the Congress recognized that the complexity of the problem was such that altogether exceptional measures ought to be taken to ascertain the general wishes of specialists before any definite proposals were formulated for submission to the Congress. It was with this two-fold consideration in mind that the Paris Congress decided at once to take certain action for strengthening and developing existing mechanisms (in the directions indicated in the present note) but to postpone until their next meeting the consideration of the underlying fundamental issue, namely how to reconcile the application of the Law of Priority retroactively to 1758 with the practical needs of securing stability in zoological nomenclature. It was the earnest hope of the Congress that the fullest advantage would be taken of this interval both by systematists and by workers in the field of applied biology to make known their views as to the nature of the solution to be sought and the means best calculated to secure that end, in order that the Report on this subject, to be prepared by the Secretary for the consideration of the Commission and the Congress, should be based on the widest possible knowledge of the wishes of interested specialists.

*Secretariat of the Commission, 28 Park Village East, Regent's Park,  
London, N. W. 1, England, February 27, 1950.*

BIRD NAMES IN LINNAEUS' 'CATALOGUE' OF  
EDWARDS' NATURAL HISTORY

BY JAMES L. PETERS

IN March, 1949, Mr. W. L. McAtee circulated a privately printed sheet calling attention to an overlooked work by Linnaeus, namely "A / Catalogue / of the / Birds, Beasts, Fishes, Insects, Plants etc. / contained in / Edwards' Natural History / in seven Volumes, / with their Latin names /" By Sir C. Linnaeus / Medical and Botanical Professor of the Royal Academy / at Upsal, etc. / London / Printed for J. Robson, Bookseller / New Bond Street / MDCCLXXVI.

This 'Catalogue' together with "Some / Memoirs / of the / Life and Works / of / George Edwards / Fellow of the Royal and Antiquarian Societies /" was published by Robson in 1776, 12 years after the last (third) part of Edwards' 'Gleanings of Natural History' appeared.

Just why Robson, who was not the original publisher of Edwards' works, undertook this 'Memoir' and 'Catalogue' is not clear. Be that as it may, at the end of the 'Catalogue' is a suggestion that "it is recommended in binding the whole work, that the foregoing CATALOGUE be placed immediately after the LIFE AND ADDENDA, before the preface to the first Volume." It is highly probable that most subscribers to Edwards' works had had their sets bound long before the publication of the 'Memoir' and 'Catalogue' and, therefore, not all sets contain these supplements. However the 'Memoir' and 'Catalogue' are probably not very rare. McAtee examined a set in Chicago, Wetmore found one in Washington, there are two in the Museum of Comparative Zoölogy, and others doubtless exist elsewhere.

The 'Catalogue' was prepared by Linnaeus, probably from memory, or at least very hastily, judging from the numerous errors. Some of the birds figured by Edwards are identified to genus only, although they represented species named by Linnaeus himself either in the 10th edition of the 'Systema Naturae' (1758) or the 12th (1766). In some cases a plate contained two very different species, but Linnaeus used but a single generic name to cover the two. In a few cases he inadvertently used mammalian names, as for instance plate 265 which depicts a pair of sunbirds, is listed in the 'Catalogue' as *Mus avellarius*, or plate 230 which is referred to as *Rhinoceros unicornu* although a parrot is figured. On the whole the plates which appeared in time for Linnaeus to make use of them in 1758 appear to be correctly identified by him in 1776 in nearly all cases, and the bulk of the errors appear to be connected with the plates published subsequent to 1760.

Edwards' works appeared in seven volumes (or parts as they are called on the title pages). The first four parts are entitled "A Natural History of Birds," the last three, "Gleanings of Natural History." In the 'Natural History' each plate is accompanied by a page of text numbered the same as the plate; in the 'Gleanings' a new pagination is begun and page numbers do not correspond to plate numbers, but throughout the entire seven parts the plates are numbered consecutively from 1 to 362. It is, therefore, only necessary to list the plate numbers to refer to any species figured.

The dates of the several parts of Edwards' works and plate numbers contained in each are as follows:

NATURAL HISTORY OF BIRDS				GLEANINGS OF NATURAL HISTORY			
Pt. 1	1743	Plates 1-52		Pt. 1	1758	Plates 211-260	
Pt. 2	1747	Plates 53-105		Pt. 2	1760	Plates 261-310	
Pt. 3	1750	Plates 106-157		Pt. 3	1764	Plates 311-362	
Pt. 4	1751	Plates 158-210					

In the list of species named for the first time in the 'Catalogue' I have omitted obvious typographical errors such as *arecticus* for *arcticus*; *Certhra* for *Certhia* etc. and only list either new names, or names 'emended' when the emendation places them in the category of a different name.

Parenthetically it may be noted that in several cases where Linnaeus listed a species only by a generic name, had he applied a specific name as well, such a name would have antedated the one given by Gmelin or even later authors. Such cases are plates 2, 3, 136, 227, 244, 250, 296, 300, 333, 346.

The new or emended names are as follows. Page references are to the 'Catalogue'; plate numbers to Edwards; type localities *ex* Edwards:

- p. 6, pl. 61. STRIX NYCTELEA (Hudson Bay) = *Strix Nyctea* Linn., 1758, = *Strix scandiaca* Linn., 1758. Now *Nyctea scandiaca* (Linn.).
- p. 8, pl. 121. MOTACITTA [sic] CALIDRIS (Jamaica) = *Motacilla calidris* Linn., 1758. *Motacilla* is doubtless a typographical error for *Motacilla*. The species figured is not recognizable but by no stretch of the imagination can it represent a Black-whiskered Vireo.
- p. 8, pl. 127. LOXIA DOMINICA (Brazil) = *Loxia Dominicana* Linn., 1758. Now *Paroaria dominicana* (Linn.).
- p. 9, pl. 159. PSITTACUS ARARACINA (no locality) = *Psittacus ararauna* Linn., 1758. Now *Ara ararauna* (Linn.).
- p. 9, pl. 182. PICUS SENEGALLENSIS (Bengal) = *Picus benghalensis* Linn., 1758. Now *Dinopium benghalense benghalense* (Linn.).
- p. 11, pl. 246. TETRAO FALCOLINUS (Cyprus) = *Tetrao francolinus* Linn., 1766. Now *Francolinus francolinus francolinus* (Linn.).
- p. 11, pl. 248. TETRAO UMBELLATUS (Pennsylvania) = *Tetrao umbellus* Linn., 1766. Now *Bonasa umbellus umbellus* (Linn.).

- p. 11, pl. 255. MUSCICAPA LUTEA (Pennsylvania) antedates *Motacilla maculosa* Gmelin, 1789 (homonym, invalid), and *Sylvia magnolia* Wilson, 1811. Now *Dendroica lutea* (Linn.).
- p. 12, pl. 259. MOTACILLA VOARULA (Near London) = *Motacilla boarula* Linn., *Mantissa Plantarum*, 1771. Now *Motacilla cinerea cinerea* Tunstall.
- p. 12, pl. 262. TODOS [sic] CINEREUS (Surinam) = *Todus cinereus* Linn., 1766. Now *Todirostrum cinereum cinereum* (Linn.). It might be argued that *Todos* and *Todus* are different generic names and that the former should replace *Todirostrum* Lesson, 1831. However, in view of the numerous typographical errors in the 'Catalogue,' I should consider *Todos* as such.
- p. 13, pl. 295. CRAX GLOBIFERA (no locality) = *Crax globicera* Linn., 1766. Now *Crax rubra* Linn., 1758.
- p. 13, pl. 304. PASSER PENNSYLVANICA (Pennsylvania), antedates *Fringilla albicollis* Gmelin, 1789. Now *Zonotrichia pensylvanica* (Linn.).
- p. 13, pl. 305. VERMIVORA AMERIC (Pennsylvania), antedates *Motacilla vermivora* Gmelin, 1789. Now *Vermivora americ* Linn. *Vermivora* is also a new generic name at this point and antedates *Vermivora* Swainson, 1827.
- p. 13, pl. 315. PSITTACUS SPECTRUM (Surinam). This is the same as *Psittacus fuscus* P. L. S. Müller, *Natursyst.*, Suppl., 1776: 78 (Cayenne, ex Daubenton, pl. 408). Since both *Ps. spectrum* and *Ps. fuscus* are of the same date, as first revisor under Article 28 of the International Code, I select *Psittacus fuscus* Müller, 1776, as the name of the species, thereby avoiding any change in nomenclature. Now *Pionus fuscus* (Müller).
- p. 13, pl. 316. PSITTACUS SPECTRUM (East Indies), antedates *Psittacus aterrimus* Gmelin, *Syst. Nat.*, 1 (1), 1788: 330 (New Holland). Since both plates 315 and 316 representing two very different species are given the same name, it follows that one of them is a homonym of the other. As first revisor I select *Psittacus spectrum* based on plate 315 of Edwards as the prior name, and it follows that *Ps. spectrum* based on plate 316 becomes unavailable—therefore no change in nomenclature need ensue.
- p. 13, pl. 320. CORACIAS BICATOR (Ceylon; error = ?). The plate plainly depicts one of the African glossy starlings of the genus *Lamprocolius*, but cannot be exactly matched by any species. Dr. Chapin and Mr. Amadon believe that it might be an attempted representation of *L. nilens*; to my mind, the double row of large black spots on the wings looks more like the condition found in *L. splendidus*; other details however are not in agreement and I, therefore, believe the best course is to regard the plate as unidentifiable.
- p. 13, pl. 321. TURDUS ZEYLONICUS (Ceylon; error = Cape of Good Hope) = *Turdus zeylonus* Linn. 1766. Now *Telophorus zeylonus zeylonus* (Linn.).
- p. 14, pl. 337. MELEAGRIS HYBRIDA (Hanford, Dorset) = Hybrid, *Lyrurus tetrix* x *Phasianus colchicus*. I am indebted to Mr. Jean Delacour for assistance in identifying the bird figured on this plate. He informs me that there is a skin from Devonshire in the American Museum exactly like it.

*Museum Comparative Zoölogy, Cambridge 38, Massachusetts,*  
*April 4, 1950.*

## GENERAL NOTES

**Feather Replacement in Cassowaries, *Casuaris*.**—Friedmann has recently published a note (Auk, 66: 74-75, 1949) on the unusual replacement of feathers in Penguins, in which the new feather is nearly fully formed before the old one is shed, and the new feather actually pushes out the old one. Stresemann (Handb. der Zool., VII, Aves, 1927: 32) writes that Penguins and Cassowaries agree in feather replacement in the new feathers pushing out the old and bearing them for a time on their tips. This results in a union between the two generations for a time, and in this Penguins and Cassowaries differ from all other birds in which the beginning of the development of the new feather is accompanied by a shedding of the old.

Shortly after I read Friedmann's note, the Chicago Natural History Museum received in the flesh a Cassowary from the Brookfield Zoo, Chicago. The bird, an adult male *Casuaris unappendiculatus* Blyth, was very fat, weighing 85 pounds, and was in the process of general body moult. This gave an opportunity to compare the feather replacement with the described condition in penguins.

In the Cassowary before me I was able to find but a single sprouting feather, which was projecting about 3 millimeters above the surface of the skin, that bore an old feather on its tip as Stresemann described. On the other hand, many emerging new feathers, about 10 millimeters long, were found not bearing old feathers on their tips. This seems to indicate that in the Cassowary, though the new feathers may push out the old, these old feathers quickly drop off.

The moult of Penguins appears to be a sudden thing; the feathers are not cast a few at a time, but over large areas of the body the old feathers lose direct attachment with the body and fall off in large numbers. The loss of masses of shedding feathers from parts of a penguin has been likened to the shedding of a snake skin (Pycraft, Nat. Antarctic Exped., 2: 13, 14, 1907). The condition in the Cassowary, judging by the present specimen and my recollections of many examples handled in the field, is different. The moult is a gradual thing, a few feathers being replaced at a time, scattered over the body of the bird, rather than a sudden complete shedding over considerable areas. There is thus no sudden change in the appearance of the bird.

The subcutaneous development of the Cassowary feather is slight compared with the described condition in the Penguin. In the Penguins the descriptions indicate the new feather is nearly or quite fully developed and closely curled in its follicular sheath in the subcutaneous tissue. In the Cassowary before me the old feathers are inserted about 5 millimeters in the tissue, while the feather follicles containing the growing feathers are inserted about 10 millimeters; the follicle or sheath shows none of the highly polished, smooth, corneous appearance Lowe (Proc. Zool. Soc. London, 1933: 498-502) described for the Penguin. Opening the follicular sheath, there appeared no unusual growth of new feather packed into it; apparently the new feather, that when grown may be up to about 300 millimeters long, pushes out as it is developed.

From the above we can conclude that while the feather replacement of Cassowaries resembles that of Penguins in that the new feather may push out the old, and may bear the old feather on its tip for a time, there are many points of difference: the Cassowary's old feathers are soon shed after being pushed up from the skin; the loss of old feathers is a gradual one over the whole body of the bird; and there is no great subcutaneous development of the new feather prior to its pushing out the old, but the pushing-out occurs as the feather develops.



It may be well to mention here that it is usual for birds' natal down to be pushed out by the first generation of feathers on the tips of which it may be borne for some time and that, as an abnormality, individual feathers have been reported borne on the tips of those of the next generation in the Magpie Pigeon (Jackson, Brit. Birds, 6: 339, 1913), the Knot, *Calidris canutus* (Bonhote, Proc. Zool. Soc. London, 1906: 901), a Chinese Magpie (Kleinschmidt, Journ. für Orn., 1903: 142) and a chick (Kleinschmidt, Journ. für Orn., 1899: 115).—A. L. RAND, *Chicago Natural History Museum, Chicago, Illinois.*

**Sun-grebe, *Heliornis fulica*, in Veracruz, Mexico.**—Ridgway and Friedman (Bull. U. S. Nat. Mus., 50 (9): 230, 1941) reported the occurrence of the Sun-grebe, *Heliornis fulica* (Boddaert), in Mexico only from the Río Coatzacoalcas in the extreme southern part of Veracruz. That this species ranges at least 125 miles north of the Río Coatzacoalcas is evidenced by a specimen in the Texas Cooperative Wildlife Collection, taken by David Donaldson at Boca del Río, a short distance south of the city of Vera Cruz. This bird, an adult male weighing 141.6 grams, was encountered July 23, 1941, in the tidal waters of the Río Moreno. The testes were small (non-breeding) in size. Seemingly, this specimen constitutes the second record for Mexico.—WILLIAM B. DAVIS, *Department of Wildlife Management, Texas A. and M. College, College Station, Texas.*

**Albatross Feather from Jones Beach, Long Island, New York.**—On November 7, 1948, walking along the high water line at Jones Beach, a rather large (14.75 inches) primary feather was noticed. Picked up and passed close to the nostrils it appeared to have the characteristic odor of the Tubinares. It showed no sign of having been in the water. Normally, a "gull" feather with slightly odd odor would be noted with but passing interest. In this instance, however, the odor was so strong and so firmly reminiscent of *Diomedea* that it was forwarded to the American Museum of Natural History for identification.

Dr. R. C. Murphy wrote on November 26, 1948, as follows: "The wing quill from the Long Island shore is beyond any shadow of doubt that of an albatross. While it is very worn, it appears to have been not long moulted. It is definitely not *Phoebastria*, in which the outer vein of the primary feathers is always much narrower. This leaves only the genus *Diomedea* and the section sometimes called *Thalassogeron*. I doubt whether the quill is positively identifiable as to species. It is, however, relatively small, both in breadth of the whole quill and in the length and diameter of the shaft. In these respects it most closely resembles *Diomedea chlororhynchus* which is the smallest species of this group of albatrosses ever to be recorded from the Atlantic Ocean. Incidentally, this species has yielded more North American records than any of the other possibilities."

A short time later it was learned that a shipment of albatross feathers had recently found their way into the millinery markets of New York. Samples of these feathers were placed at the disposal of the American Museum by the National Association of Audubon Societies and comparison was made with the specimen from Jones Beach. Dr. Murphy wrote as follows on December 2, 1948. "Your beach quill, although very worn, is longer than the longest of the North Pacific primaries. It also lacks the striations on the shaft which all the others show. It agrees in its relative narrowness and emarginate tip with the southern hemisphere 'Thalassogeron' mollymauks. It certainly is not the species of these millinery quills and was, in all probability, a naturally moulted feather."

It is of course possible that this feather found its way to Jones Beach via some vessel from the South Atlantic. The evidence seems to suggest, however, that it

arrived in its northern location on the bird to which it belonged. It is now in the American Museum. When one considers that the strong odor is the only reason this feather was originally collected and identified, one is moved to speculate that similarly interesting plumage may occur along the beaches more frequently than is supposed. Drifted feathers might be worth some attention.—DAVID G. NICHOLS, 181 Liberty Avenue, Westbury, New York.

**Occurrence of the Cattle Egret, *Bubulcus i. ibis*, in Surinam, Dutch Guiana.**—The first record of the Cattle Egret in Surinam on March 10, 1946 (Auk, 64: 143, 1947) proved of more importance than the mere observation of a straggler. In the same district I observed on December 12, 1946, two individuals on the bank of the Nickerie River.

On the afternoon of December 26, 1946, while driving to Meerzorg, on the right bank of the Surinam River, opposite Paramaribo, I observed flocks of Cattle Egrets in the fields on both sides of the road, in close association with feeding cattle. Returning to the same spot on December 28, there were three flocks of Cattle Egrets consisting of about 50, 30 and 25 birds, respectively. I succeeded in collecting a specimen. On January 11, 1947, I went again to the same locality and collected six more.

Now that I knew that this egret was numerous in the cultivated area on the right bank of the Surinam River I went searching for them in other places. It was found that the birds were equally common in the open fields on the left bank of the Surinam River, wherever there were cattle.

In the vast area along the Gemeene Landsweg (the road leading from Paramaribo westwards to the Saramacca River) and the Kwattaweg and all their byways, I observed at least 100 birds on January 15, 1947, and on February 12, 1947, about 200 birds. I collected two specimens here on February 21, 1947. In all, I collected ten specimens.

A further search revealed that the birds were also present at Domburg (about 20 kilometers up the Surinam River from Paramaribo, on its left bank) on February 8, 1947. So it became clear that *Bubulcus ibis* was in fact the most numerous heron in all cultivated areas between the Surinam and Saramacca rivers. It also occurs in other districts of the coastal region; on March 14, 1947, I observed five birds near grazing cattle on a meadow at Coronie, about 45 kilometers due west of the mouth of the Coppename River. On May 5, 1947, there were at least 100 birds in the rice-fields on the right bank of the Corantijn River at Nieuw Nickerie. Until then I had never observed them, however, at Moengo on the Cottica River, the center of the bauxite mines, where a number of cattle are kept on a large meadow but which is perhaps too much an isolated place.

It further became clear that the egrets roosted in the low bushes along the Surinam River just opposite Paramaribo where the river makes a sharp hairpin curve to the south. This was, in fact, the main roost of all Cattle Egrets in the neighborhood of this town. The largest number (about 600) of egrets assembled in this roost was counted on February 10, 1947.

This roost was also used by the birds feeding on the left bank of the Surinam River. In the afternoon they could be seen crossing the river, flying low over the water to alight in the bushes. On January 7, 1948, I observed a flock of about 100 birds flying on a broad front, low over the houses of the town in the direction of the river. It reminded me very much of the flocks of Black-headed Gulls, *Larus ridibundus*, on their evening flight in Europe. It further became clear that the birds were present in these places during only a part of the year and that they were gone from all places

around Paramaribo by the end of April and the beginning of May. They returned in November after the harvest of the rice. On April 24, 1947, they had gone from all their favorite feeding grounds west of Paramaribo, and on May 10, 1947, they were not present anymore at Meerzorg. They were back at Meerzorg on November 4, 1947. In 1948, they had left Meerzorg by March 27; a single bird was seen on April 3. They came back into this area on November 14.

The question arises—where do these birds go in the meantime and where do they breed? I suspect that they all go to the coast, which is densely wooded with *Arcennia nitida*, to breed in some inaccessible place. There were no Cattle Egrets present, however, in a mixed colony of *Guara rubra*, *Leucophoyx thula*, *Hydranassa tricolor* and *Nyctanassa violacea* near the mouth of the Saramacca and Coppename rivers which I visited on June 5, 1948. That the birds do breed in this country is, however, certain. One of the birds collected at Meerzorg on January 11, 1947, had enlarged testes, and its plumage showed the beginning of its breeding dress. A male collected west of Paramaribo on February 21, 1947, also had enlarged testes. In February and March, all birds were in full breeding plumage.

As to the occurrence of the Cattle Egret in neighboring countries, I will draw attention to the fact that a second specimen, shot from a flock of eight birds, was obtained in Venezuela (Walter Dupouy, Primer Congresillo de Ciencias Naturales, Caracas, pp. 1-5, 1948). As to British Guiana, Phelps (Bol. Soc. Venezolana de Ciencia Naturales, 10: 230-231, 1946) quotes an interesting letter from Mr. Hunter, owner of the sugar plantation 'Versailles' on the right bank of the Demarara River, who has observed flocks of Cattle Egrets in this area since 1930. How did this Old World species turn up in tropical South America? Several solutions are at hand. The first being that the bird was always indigenous but that it has been overlooked. This seems, however, extremely unlikely. In British Guiana, it certainly could not have escaped the attention of such a keen field ornithologist as the late J. J. Quelch. As for Surinam, I think it is out of question that it should not have been obtained by one of the numerous assistants of the three Penard brothers at the time their collections were brought together in the last part of the 19th and the beginning of the present century. Their principal collectors lived in the very area where the bird is at present numerous.

The second solution is that the flocks are descendants of escaped birds. This seems unlikely too, as I do not know of any zoological garden or aviculturist either in Surinam or in British Guiana in the last years. It is true, however, that *Bubulcus* breeds freely in captivity. According to the 'Handbook of British Birds' Vol. III, p. 144, a considerable number of Cattle Egrets have been released by the Zoological Society at the Whipsnade Zoo since 1931 and a few in 1930 in Surrey. Some have also been released (1929 and 1938) at the Dublin Zoo. These birds have wandered in all directions, even as far as Iceland, and have caused great confusion. I must stress, however, the fact that all these birds belonged to the Indian race, *B. i. coromandus*, which was imported. The specimens from Surinam (males, January 4, and February 21, 1947) which I sent to the American Museum of Natural History at New York, belong to the typical race *ibis*, according to Zimmer.

The last solution, which I believe the most likely one, is that some birds or a flock found its own way to the coastal region of tropical South America and settled in an area which proved favorable for the birds.—FR. HAVERSCHMIDT, Paramaribo, Surinam, Dutch Guiana.

**Concentration of Trumpeter Swans, *Cygnus buccinator*, in British Columbia in Winter.**—In 'The Auk' (59: 100, 1942) there were published some notes on Trumpeter Swans in British Columbia, Canada, which were sent to me by Mr. Ralph

A. Edwards who lives in the region where these swans spend the winter. I gave these notes to Dr. H. H. Chapman and he sent them to 'The Auk.'

Under date of April 3, 1949, Mr. Edwards wrote me as follows: "Early last fall we thought we had about 84 but quite a few of them hung around various lakes and the river, so it was not a complete count. Later, we got better track of them—nearly 100 with 24 cygnets. We had to start feeding the first week in December and soon had 63 regular boarders, 16 of them cygnets.

"It seems to take about one-half pound of grain per day to keep one of these big birds flying, so we soon found our supply of a ton of grain dwindling. I wired the Government for another 1000 pounds so as to be able to bring all of them through the winter. The Government promptly flew in a DC3 transport plane, dropping the feed by parachute. This was in mid-February and as the winter became more severe several more swans and another cygnet joined our band, but of the eight cygnets that were staying below us on the river only two survived. The ones that stayed here regularly and had grain every day lived and remained strong, even one family of five cygnets.

"Our daughter Trudy did the feeding because I was away on the trapline so much. The swans are very sensitive to any change in routine, to any change in feeders or even to any change in the garments worn by the feeder. Of course when there is lots of open water one does not need to come in very close contact with them in order to feed, but when the lakes and river freeze except for a tiny hole they are pretty tame; otherwise, they fly away to some other lake and sit on the ice and starve, as they did before we started feeding them.

"This winter the river at our place froze from the bottom up and ran all over the country, a stream of ice crystals almost too sticky to run, so we could not always feed in the river in the same way we had been doing. We used to dump half a sack or so in the lake at a time, but we now feed every day with better results. For the past few years Trudy has been able to keep a small hole open in the river by chopping the ice when the surface froze and the swans learned to have confidence in her. But this winter when the big cold came the river was out, and we had to find another place to feed. Across the lake and down about a mile there has always been a narrow streak of open water, kept that way by springs, so Trudy packed the grain down there; the trumpeters followed her and were able to eat in the coldest weather.

"The swans had just been fed when the R. C. A. F.'s DC3 flew in, and the birds continued to sit there while the big plane flew back and forth dropping sacks of grain in parachutes in plain sight of them. Then the plane made a final circle at about 150 feet elevation over them, and they did not move. Since we have been feeding every day we have been able to conserve practically all the grain for the swans. The ducks are wilder and fly out when Trudy goes down to the feeding place, so the swans get all the grain. Each swan will clean up about one-half pound of feed in about 20 minutes."

The region where these swans occur is very remote from any settlement, but the land along the river and at the end of the lake Edwards referred to is owned by a trapper who is most anxious to sell to someone who would be interested in having the Trumpeters protected and a sanctuary created for their benefit. The Conservation Department of the Canadian Government does not like to disclose the whereabouts of rare species threatened with extinction except to accredited persons. For this reason I have omitted the exact location of this concentration of Trumpeters, but I will be glad to give the pertinent information to responsible organizations or individuals.—JOHN P. HOLMAN, *Fairfield, Connecticut.*

**American Brant, *Branta b. hrota*, in Georgia.**—On a short collecting trip to the coastal islands of Glynn County, Georgia, an American Brant, *Branta bernicla hrota*, was collected. The specimen was shot by the writer on December 29, 1948, from a flock of six which flew low along the beach at the northern end of Sea Island, Georgia, near the mouth of the Hampton River.

The skin was prepared by William W. Griffin, and its identification has been confirmed by Dr. Alexander Wetmore of the Smithsonian Institution. The bird, upon dissection, was found to be a female with a granular ovary and with marked absence of fat in all areas. The skin is in the collection of Mr. Griffin and bears his original number 584.

This is the first published record of the occurrence of this species in the state of Georgia.—GEORGE W. SCIPLE, 100 Terrace Dr., N. E., Atlanta, Georgia.

**Food of Young Pintail Duck, *Anas acuta*, in Alaska.**—On July 13, 1948, I collected a downy young American Pintail at Kiana, on the Kobuk River, Alaska. The stomach of the bird proved to be packed full of mosquito larvae. Kortright (Ducks, Geese, and Swans of North America, 1943: 194) remarks that while the diet of the Pintail is nearly nine-tenths vegetable, it will make its meal of whatever food is most handy or plentiful at the moment. At the season in which the bird was taken, mosquito larvae are one of the most abundant forms of food available in the arctic, to animals which can utilize them.

Many attempts have been made at various times to discover mosquito predators which might be able to keep down the summer hordes of the Far North. The Alaska Railroad, according to information received from Dr. Adolph Murie, once went so far as to import frogs for this purpose. As the Pintail is one of the commonest nesting birds of the north, it may be considered an important check on the mosquito, if all birds, adults and young, eat mosquito larvae (or adults). Further studies of the extent to which the Pintail utilizes this food are desirable.

Dr. Robert Storer and Mr. Harrison B. Tordoff of the Museum of Zoology, University of Michigan, where the bird is now deposited, kindly identified it for me. The bird was collected on an expedition supported by the Arctic Institute of North America, with funds provided by the Office of Naval Research.—RODGERS D. HAMILTON, Arctic Research Laboratory, Box 1310, Fairbanks, Alaska.

**Tularemia in the Red-tailed Hawk, *Buteo jamaicensis calurus*.**—Tularemia is primarily a diseased condition of rabbits and rodents. In any wildlife area tularemia is prevalent due to numerous ticks and deerflies. Recently, tularemia has been described in birds. Kursban and Foshay (Journ. Amer. Med. Assoc., 131: 1493-1494, 1946) have reported tularemia in the Pheasant, Grouse, Sage Hen, Horned Owl, Quail and the Chicken Hawk.

On July 29, 1949, a juvenile female Western Red-tailed Hawk, *B. j. calurus*, was shot at the foot of Uhl Hill, Moran, Wyoming, in the Jackson Hole Region. Since, at the time, the author was engaged in field research to determine the prevalence of tularemia in rodents in the Jackson Hole Region, equipment was available for bacteriological examinations. An autopsy was performed on the hawk. There were no internal lesions of the liver, spleen, or kidney. Blood was drawn from the heart using sterile technique and inoculated onto glucose-blood-cystine agar (Difco). At the same time a blood smear was made and stained by the Gram staining method. The inoculated media was incubated at 37° C. for four days. On the fourth day the media was examined and a colony characteristic of *Pasteurella tularensis*, the causative agent for tularemia, was observed. A Gram stain of the single, pure, colony



showed Gram-negative, capsulated, pleomorphic rods. A physiologic saline suspension of this growth was made and injected intraperitoneally into a mouse. This mouse was kept in a cage and observed periodically. On the eighth day the mouse died. Upon performing an autopsy on the mouse, typical necrotic foci of the liver were observed. A glucose-blood-cystein agar (Difco) was inoculated with material taken from the liver. This was incubated at 37° C. for four days. After four days a Gram stain was made of the growth and Gram-negative tularemia rods were seen under the microscope. A positive reaction for tularemia was obtained. This would seem to be the first record of tularemia occurring in the Red-tailed Hawk. Further work is being carried on to detect tularemia in other birds in this area.—MITSURU NAKAMURA, Dept. of Bacteriology, University of Southern California, Los Angeles, California.

**A Ruffed Grouse, *Bonasa umbellus*, that did not Abandon her Nest.**—On May 17, 1941, four men on a road maintenance crew were breaking granite boulders that obstructed a road which paralleled Ampersand Brook in Harrietstown, Franklin County, New York. One particular rock was so big it had to be tapped and blasted. After the rock was drilled, two sticks of 40 per cent dynamite were placed in the hole. The charge when exploded blew big and little pieces of granite all over the place.

Seven feet from where the men had been working with the drill stood a hardwood tree about eight inches in diameter. As the men moved rock fragments off the road, a larger than average piece was pushed to within two feet of the hardwood tree. At this point a grouse flew up from a nest situated at the base of the tree and so exposed as to be in a line between the tree and the rock. She had stayed on her nest for about four hours while men drilled and blasted, but a three-foot high fragment of rock rolled to within a foot and a half of her nest was too much. Nevertheless, she came back and nine of the ten eggs hatched about two weeks later.—C. W. SEVERINGHAUS, Wildlife Research Laboratory, Delmar, New York.

**On the Name *Francolinus sephaena spilogaster* Salvadori.**—In 1934 when Grant and Mackworth-Praed revised the races of *Francolinus sephaena* (Bull. Brit. Orn. Club, 54: 170-173, 1934) they remarked that "... existing names have been used without taking into consideration the essential points in the original descriptions."

Then they synonymize the name *F. s. spilogaster* Salvadori, that was currently in use for the "stripe-bellied" bird from eastern Abyssinia and British Somaliland, with *F. s. grantii* which ordinarily lacks these stripes. They then propose the new name *F. s. somaliensis* for the form with ventral chestnut-brown stripes from British Somaliland.

They say that in the original description they found no reference to ventral chocolate stripes and are surprised to find the description applies to a "plain-bellied" form. However, in looking up the original description of *spilogaster* (Salvadori, Ann. Mus. Civ. Genova, 26: 541, 1888) I find two different mentions, both on page 541, of ventral streaking as follows:

"... pectore maculis scapilibus castaneis . . ." (breast marked with chestnut) and "... e che somigli specialmente al *F. kirki*, avendo come questo le macchie longitudinali castagne sul mezzo delle piume delle parti inferiori . . ." (it may look similar to *F. kirki* in having like it the longitudinal chestnut spots upon the middle of the feathers of the underparts).

And if this were not enough to establish the fact of ventral striping, Ogilvie Grant (Ibis, 1890: 347) borrowed the type of *F. spilogaster* and compared it with *F. kirki*



(= *F. s. rostrata*, a form of this species with distinct ventral stripes). He remarks that in plumage there is no difference and the type of *spilogaster* differs from *kirkii* only in its greater size.

In their later review of this species, Grant and Mackworth-Praed (Bull. Brit. Orn. Club, 66: 74-77, 1946) divide these francolins into two species, on the basis of whether or not they have ventral stripes. Here too, the name *spilogaster* is left in the synonymy of *grantii* and characterized as without chocolate spots or stripes below. Irrespective of the advisability of dividing these birds into two species, which is more than doubtful, both in Salvadori's original description and in Ogilvie Grant's comments on the re-examination of the type, *spilogaster* has brownish stripes on the underparts and is not a "plain-bellied" bird.

A further point must be made. In the case of species, the type (not the description of the type) is all important in determining the allocation of a name, but in the study of subspecies, which deals with populations, it is the composition of the population at the type locality which is important. The type itself may be aberrant, and we must use the average characters of the birds at the type locality.—A. L. RAND, Chicago Natural History Museum, Chicago, Illinois.

**A Summer Record of Long-billed Curlew, *Numenius a. americanus*, in Florida.**—The Long-billed Curlew is now so rarely seen on the Atlantic coast that all records of its occurrence are worth reporting. At approximately 5:15 p. m. on July 8, 1949, the writer, accompanied by Gustav Hall and Dean Leach, observed a curlew on the beach along the Eddie Rickenbacker Causeway which connects Miami, Florida, with Virginia Key across Biscayne Bay. With a 14-power spotting scope this bird was watched for about 15 minutes, after which Leach crawled through scrubby vegetation to within ten feet before it took wing. The large size of this bird, the exceptionally long, decurved bill (about 7 inches) and the absence of a distinct dark line from the bill through the eye served to identify it as a Long-billed Curlew. The bird was feeding with several dowitchers, *Limnodromus griseus*, Ruddy Turnstones, *Arenaria i. morinella*, and Black-bellied Plovers, *Squatarola squatarola*. The curlew was not present on the following morning when the group returned to study it further.—FLOYD B. CHAPMAN, Ohio Division of Wildlife, Columbus, Ohio.

**Another Nest of the Smooth-billed Ani, *Crotophaga ani*, in Florida.**—The only known nesting records of this species in Florida have been published by Sprunt (Auk, 56: 335, 1939) and Dilley (Auk, 65: 313, 1948). Sprunt found it nesting in the Miami area, and Dilley in the vicinity of Clewiston and at Moore Haven. On July 6, 1949, while driving southward on Florida State highway A1A, the writer observed an Ani on a telegraph wire at the Golden Strand Hotel, just north of Surfside and about five miles north of Miami Beach. The bird permitted close observation with binoculars and 14-power telescope for about 20 minutes and it was easily identified. Dean Leach, Gustav Hall and I located the manager of the hotel, Mr. William Myers, and were advised by him that the Anis had a nest in a tree at the southwest corner of the hotel. The nest was rather bulky, appeared to be composed entirely of grasses and was about 15 feet from the ground. Neither of the birds was at the nest. It was impossible to make further observations that day but on the following morning the site was revisited, and Mr. Myers kindly permitted the group to enter the hotel and observe the nest about eight feet from a lower window. One of the birds was sitting on the nest. While the party watched, this bird left for a few minutes, then it or its

mate returned with insect food which was given to young in the nest. The heads of two fledglings could be seen reaching for food.

The Myers' reported seeing about a dozen Anis at the hotel in the spring of 1949, but only one pair remained to nest. The first nest was built in a tree at the rear of the hotel, but it and four eggs, three of them broken, were later found on the ground. The birds then began immediately to build the second nest described above. According to the Myers', both birds built the nests and took turns incubating; occasionally one bird would bring food to the other engaged in incubating. They also observed that the Anis were rather tame but seemed to avoid birds of other species. Anis had not been seen at the hotel prior to 1949.—FLOYD B. CHAPMAN, *Ohio Division of Wildlife, Columbus, Ohio.*

**The Flammulated Screech Owl, *Otus f. flammeolus*, in Louisiana.**—On January 2, 1949, the writers discovered a small owl at an elevation of 25 feet above sea level in a dense willow thicket along the Mississippi River on Sardine Point in West Baton Rouge, Louisiana.

The bird was collected and taken to the Louisiana State University Museum of Zoology where George H. Lowery, Jr. and Robert J. Newman promptly identified it as a Flammulated Screech Owl, *Otus f. flammeolus*; it was an adult male. The specimen was deposited in the Louisiana State University Museum of Zoology.

The 1931 A. O. U. Check-List states that this owl is found in the higher mountainous regions of the West from southern British Columbia to Guatemala. An intensive search of the literature failed to reveal records of this bird occurring nearer than Boot Springs in the Chisos Mountains of western Texas as reported by Van Tyne and Sutton ('The Birds of Brewster County, Texas,' Univ. Mich. Mus. Zool., Misc. Publ. No. 37: 36, 1937). Since that locality is approximately 800 air miles to the west, this is believed to be the most easterly record of the Flammulated Screech Owl in the United States. Only one other record was found of the bird having been taken at such a low elevation. J. T. Emlen, Jr. (Condor, 37 (1): 43, 1936) reports capturing one at an elevation of 45 feet in the Sacramento Valley.

Upon being approached, the bird flew only a few feet before alighting on broken willows, always facing the intruders. After the owl had repeated this performance a few times, one person attracted its attention, and another approached from the rear and captured it by hand. Upon capture, it was found that it had been shot in the left wing, although the bird was not seriously wounded and appeared to use its left wing normally.—LESLIE L. GLASGOW, CLAUDE H. GRESHAM AND STEPHEN HALL, *Louisiana State Univ., Baton Rouge, La.*

**Saw-whet Owl, *Aegolius a. acadicus*, in West Virginia.**—On November 19, 1948, while driving along the summit of Kennison Mountain at an elevation of 3988 feet, Pocahontas County, West Virginia, Clarence Young of Marshall College saw on the highway a small owl with a damaged wing. He brought it to me, and I identified it as a Saw-whet Owl. It was kept alive for several days but refused to eat and died. On skinning it I found it to be an adult male with the testes measuring about 2 by 3 mm.

Dr. George M. Sutton, to whom I presented the specimen, has added it to his collection of West Virginia birds, now housed at the Museum of Zoology at the University of Michigan. He has identified it as the wide-ranging, well known race, *A. a. acadicus*. The wing measures 133 mm. (primaries pressed flat) and the tail, 70 mm. It is in fresh, unworn plumage. The strongly buffy tone of the flags and

tarsal feathering contrasts rather markedly with the white of the lower belly and under tail-coverts.

This is, apparently, the first adult Saw-whet Owl ever taken in West Virginia. The species obviously breeds in the state, for a young bird only recently out of the nest was found breeding at Cranesville, Preston County, on June 22, 1932 (Auk, 50: 361, 1933); an immature female was taken in the Cranberry Glades, Pocahontas County, on June 12, 1936 (Proc. U. S. Nat. Mus., 84 (3021): 409); and three young birds were seen near Alpena, Randolph County, in June, 1934 (Brooks, 'A check-list of West Virginia birds,' Bull. 316, 1944, Agr. Exp. Sta., West Va. Univ., Morgantown, West Va.).

Kennison Mountain is just southwest of the Cranberry Glades which is the most southern point in the Appalachian highlands at which the Saw-whet Owl has actually been found breeding, but the species certainly is to be looked for farther south.—RALPH M. EDEBURN, *Dept. of Zoology, Marshall College, Huntington, West Virginia.*

**Northern Record for *Klais guimeti* in Central America.**—Some years ago I obtained a female of *Klais guimeti* (Bourcier) from C. F. Underwood. It was collected by him at Catacamas, Olancho, Honduras, on October 17, 1937. I cannot find a record of this species being found so far north, and apparently this occurrence extends the range at least 250 miles farther from the locality of the previous most northern record in Nicaragua. For some time I have believed that this single female represents an undescribed race, but I have hesitated to segregate it,—awaiting additional material. Twelve years have passed and apparently no other specimen has been obtained from Honduras.

The upper parts are conspicuously richer in coloration, being iridescent orange, instead of the green to golden green of females taken at various localities from Caracas, Venezuela (type locality of *Trochilus guimeti* Bourcier) to Costa Rica. Thanks to the courtesy of Mr. Todd of the Carnegie Museum and Dr. Zimmer of the American Museum of Natural History, supplemented by own my large series from Ecuador, there lies before me a series of 22 adult females of the species—including five from Venezuela, five from Ecuador, and 12 from Costa Rica. Not one of them has the orange upperparts of the Honduras bird, although some from Costa Rica are "brassy" gold. In addition, the pileum of my specimen, like two females from Costa Rica, is much greener than any of the others. This character is darker as one proceeds south, the pilea of the Venezuelan birds being dark green. The name, *Mellisuga merrellii*, proposed by Lawrence, based upon an adult female from Panamá, must also be considered. Obviously a series from Honduras is required to warrant the proposal of a new subspecies.—ROBERT T. MOORE, *California Institute of Technology, Pasadena, California.*

**Observations on the Racquet-tips of the Motmot's Tail.**—Even though it is now generally known that the shape assumed by the two central tail feathers of the Motmots is dependent on the pattern of structural weakness in the feather itself and not on the bird's instinctive choice of pattern (Beebe, *Zoologica*, 1 (5): 1910), one repeatedly finds in the literature on the Momotidae the statement, apparently based chiefly on Beebe's reports ('Two Bird-Lovers in Mexico,' 1905, and *op. cit.*, 1910), that the bird "plucks" the radii from the shaft as soon as feather growth is complete (Armstrong, 'Bird Display,' 1942: 28, and Stresemann, 'Aves: Handb. der Zool.,' 1934: 831).

This statement seems, from my own observations, a misrepresentation of the case. In 1937, I transported from Europe to Australia two Motmots from Brazil (probably

*Momotus momota*, though I could not identify them with certainty). They were in a cage about one and a half feet wide, two feet long, and one foot high. When I first obtained the Motmots, the two central tail feathers were missing, but during the voyage which lasted some 50 days these grew out. As with most caged birds, the Motmots had their preferred perch for resting in the cage, as well as a preferred route in their hopping from perch to perch. The result was that one side of the tail hit the cage-wall more often than the other, and the subterminal radii on that side of the tail disappeared sooner than those on the other. One bird, in fact, still had the radii on one side of the feathers nearly perfect when the other side had been worn bare. Obviously, during ordinary preening, loosely attached radii would break off, but I observed no motions of plucking feathers; these plucking activities are, of course, quite different from simple preening movements. My observations of Motmots in the wild point to the same conclusion. In the rain forest of Chiapas, for example, in August, 1940, I observed a Lesson's Motmot, *Momotus lessoni*, almost daily at molting time. The tail feathers of this bird assumed the racquet shape within eight or 10 days after growth was complete, the radii breaking off gradually in irregular narrow sections, but I never observed the bird make any plucking movements. It seemed clear that the breakage was the result of simple preening and contact with branches and leaves.

How loosely the radii along the subterminal section of the shaft are attached was once clearly demonstrated to me when I shot a Lesson's Motmot that had its central tail feathers nearly complete. Though I packed the specimen very carefully, almost all the radii along this section of the shaft broke away during a ride of a few hours.

Another point of interest is Beebe's statement (1905: 201): "In some of the birds which we saw the process [of "plucking" the radii] had just begun, only a few barbs being torn away." To me this is most surprising, for Beebe was in Mexico from December 25 until April. The Motmots of Mexico have their molt after the breeding season, between May and early November, the exact time depending on climatic conditions which are extremely variable from year to year, as well as between different localities. For example, Lesson's Motmot in Tamaulipas molts from very early May to July, in Chiapas, August to September, and in Campeche, as late as November. It would seem impossible, therefore, that Beebe observed Motmots just after molting.

The character of the biotope in which the bird lives has its importance in relation to the problem. The tails of Lesson's Motmots that inhabit the virgin rain forests of Chiapas are sometimes still in perfect condition at the beginning of the breeding season. Here, their "*Lebensraum*" between the ground vegetation and the tree-crowns is clear and open, so that their tails are not worn by constant contact with branches and leaves. In the dense chaparrals of Yucatan, however, I have found Lesson's Motmots with tails completely bare by December. In the course of the year, especially when the pair is excavating a nest burrow, even the racquet-tips and the ends of the shafts tend to wear away.

The racquet-formation of the central tail feathers seems to be related to the Motmot's characteristic pendulum-like movements of the tail. I have noted this movement only when something seemed to be attracting the attention of the bird. I have often observed a Motmot when it was unaware of my presence and otherwise undisturbed; its tail was then invariably still, but the oscillation began as soon as I attracted the bird's attention. The tail movements are most intensive and regular during the breeding season, and infrequent or absent during molting. Near my house at the Laguna de Tequesquitego (Morelos), I daily observed a Mexican Motmot, *Momotus mexicanus*, at the beginning of the molt in July, but I did not once see the oscillating movements.

In Campeche I observed Lesson's Motmot during November and December, after completion of the molt, when pair formation was beginning (Motmots live in pairs the year round except during the molting period); the tail movements at this time were regular but not intensive. In specimens collected at this time the follicles of the ovaries were readily visible and the testes enlarged. Doubtless, intensity of the movement is directly correlated with degree of sexual activity.

During nesting, the male spends most of his time on a perch within seven meters of the burrow and oscillates his tail intensively at any disturbance. This may be considered a form of "distraction display" and may also serve as a danger-signal to the mate and to other birds near by. The racquet-shape of the central tail feathers causes a slower movement of the tip, giving the movement its characteristic "hypnotic" pattern.—HELMUTH O. WAGNER, *Apartado 7901, Succursal 3, Mexico, D. F.*

**Northern Red-cockaded Woodpecker, *Dendrocopos b. hylonomus*, in Central Florida.**—In the Twentieth Supplement to the A. O. U. Check-List, *D. borealis hylonomus* (Wetmore) was added to the Check-List as a valid subspecies (Auk, 62: 443, 1945). The material of this species available in the Louis Agassiz Fuertes Memorial Collection at Cornell University upholds Wetmore's claim that the Florida population of Red-cockaded Woodpeckers is characterized by shorter wing measurements. In Wetmore's original description (Proc. U. S. Nat. Mus., 90: 499, 1941), he states that he examined only a single specimen from the range of *hylonomus* (central and southern Florida) which fell outside the range of measurements given for that subspecies. This specimen he considered to be a straggler of *D. b. borealis* from the north.

On March 31, 1949, I collected a female Red-cockaded Woodpecker about four miles south of St. Cloud, Osceola Co., Florida. This specimen is apparently an additional record of the nominate race from within the range of the Florida subspecies. Wetmore gives the range of wing lengths of female *hylonomus* as 111.3 to 116.7 millimeters. The wing of the St. Cloud specimen measures 118.5 mm., or 1.8 mm. larger than Wetmore's largest specimen, and close to Wetmore's mean for female *borealis* (118.9 mm.). The Florida specimen which Wetmore identified as *borealis* had a wing 2.2 mm. longer than his maximum for *hylonomus*.

The St. Cloud specimen had an ovary five mm. in diameter, and weighed 41.2 grams. It was one of two seen at this locality; the other was not collected. It might be of interest to note that this specimen was collected no more than 12 or 13 miles from the type locality of *hylonomus*.—KENNETH C. PARKES, *Laboratory of Ornithology, Cornell University, Ithaca, New York.*

**Scissor-tailed Flycatcher, *Muscivora forficata*, in South-central Florida.**—The status of this species in Florida might adequately be described as irregular winter visitor in the Keys and accidental on the peninsula. Therefore, any occurrence regarding the latter is of interest. The writer has had winter field experience in the Lake Okeechobee-Kissimmee Prairie region for 14 years, during January, February and March. He never observed a specimen there until February 7, 1949, when one was seen on Trip No. 2 of the Audubon Wildlife Tours, near Lakeport, (State Highway 78) on the northwest shore of Lake Okeechobee. There were six observers aside from the writer; a recognizable photograph of the bird was secured, and study was available at a range of about 35 to 50 feet, for as long as the party wished. Specific correspondence with several resident Florida ornithologists since has failed to reveal a previous record for this region.—ALEXANDER SPRUNT, JR., *The Crescent, Charleston 50, S. C.*



**Death of a Rough-winged Swallow, *Stelgidopteryx ruficollis*.**—While watching Rough-winged Swallows course in their rather steady, even flight over South Egremont Pond, Berkshire County, Massachusetts, on June 8, 1949, we witnessed a peculiar event. In front of us and near the shore, three Rough-wings met in a swirling flight, flying for a moment in a tight circle, and one bird was seen to collide with a second. I heard a definite "click," as though a bill had struck a bony structure and one of the birds fell four or five feet to the water. It made no attempt to rise; the wings remained motionless, the eyelids moved once or twice, and then the bill and head disappeared under water. Retrieved by one of the party within ten minutes, the bird was dead and without any sign of external injury. It proved to be an adult female.—DOROTHY E. SNYDER, *Peabody Museum, Salem, Mass.*

**A Note about the Wren-babbler, *Spelaeornis*.**—The opportunity of seeing a number of specimens of this shy little Wren-babbler prompts me to discuss herewith the species of the genus. Delacour (Oiseaux, 16: 24, 1947) in his review of the *Timeline* genera lists several species under this genus but omits others. It seems necessary to make a definitive arrangement. I am most grateful to the authorities of the museums in London, Paris, and New York for the opportunity of examining material in their care, and to Mr. Kinnear for advising me of conclusions in the unpublished manuscripts of Messrs. Ticehurst and Whistler.

#### SPELAEORNIS

The genus can be defined as one of the small wren-like babblers with strong bill and legs, tail of ten feathers ranging in length from short to equal in length to the wing, and with little sexual dimorphism. Two close relatives are *Pnoepyga* and *Sphenocichla*. The former has a very short tail of six feathers and rather pronounced sexual dimorphism, plus plumage color phases. The latter is a monotypic genus characterized by distinctive size and a marked out-size, wedge-shaped bill.

#### SPECIES AND HABITS

Extraordinarily little is known about the habits or the ranges of these elusive birds. What notes there are on habits may be found in Stuart Baker ('Fauna Brit. India: Birds,' 449-457, 1922), Stanford (Ibis, 83: 215-217, 1941) and Ludlow (Ibis, 79: 252-253, 1937, and 86: 178, 1944). Several forms are still known only from single specimens obtained by traps, nets or native hunters. Examination of existing specimens shows that some ranges of obviously closely related forms are overlapping so that care must be exercised in arranging any list of species and subspecies. My list follows:

1. *Spelaeornis formosus* (Walden). Range: Darjeeling, Sikkim, Dafia Hills, Fukien, up to 9,000 feet.
2. *Spelaeornis haplonotus* (Stuart Baker). Range: Known from a single specimen and a nest with three eggs taken at Hungrum, N. Cachar Hills, Assam, at 6,400 feet.
3. *Spelaeornis troglodytoides sherriffi* Kinnear. Range: Eastern Bhutan at 12,000 feet and upwards. A good race.
4. *Spelaeornis troglodytoides souliei* Oustalet. Range: Southeast Tibet, extreme north Burma and Northwest Yunnan, west of the Mekong River.
5. *Spelaeornis troglodytoides rocki* Riley. Range: Yungning, Northwest Yunnan east of the Mekong River.
6. *Spelaeornis troglodytoides troglodytoides* (Verreaux). Range: Western and southern Szechuan. I have been able to examine one of the two specimens in Paris, collected by M. Dejean at Wa-tao-ko, Tatsienlu. The wing measures 48 mm. It is obviously conspecific with the forms previously listed under *souliei*.



7. *Spelaornis troglodytoides halsueti* (David). Range: Tsin-ling Mountains, southern Kansu and Shensi. Known only from the type.

8. *Spelaornis caudatus* (Blyth). Range: Darjeeling, Sikkim and East Bhutan, east of the Manas River from 6,000–10,000 feet.

9. *Spelaornis badeigularis* Ripley. Range: Known from a single specimen taken in the Mishmi Hills, Northeast Assam at 6,000 feet. The ranges of this form and *caudatus* in northern Assam need to be worked out. In appearance, it is close to the latter species, but see below.

10. *Spelaornis longicaudatus* (Horsfield and Moore). Range: From the Khasia Hills east to Kedimai, Manipur, Assam. Mr. Kinnear pointed out to me that Ticehurst and Whistler had found a specimen of this species from Manipur in the collection of the British Museum. I have examined this specimen and find it to differ from *chocolatinus* of the same locality. The latter is a distinct form and has the terminal barring below found in the other races with which it is included.

11. *Spelaornis chocolatinus chocolatinus* (Godwin-Austen). Range: Known from two specimens collected at Kedimai, Manipur State, Assam at 4,000 feet. Wing: (type) 48 mm., 51; tail: (type) 40, 40, culmen: (type) 11.5, 11.5. These specimens have black terminal edging on the feathers of the chest and upper abdomen which is lacking in *longicaudatus*.

12. *Spelaornis chocolatinus oatesi* (Rippon). Range: Mt. Victoria, Chin Hills, Burma, above 5,000 feet.

13. *Spelaornis chocolatinus reptatus* (Bingham). Range: Burma from the Myitkina District south through Bhamo and the southern Shan States east to western Yunnan from the Shweli-Salween Divide to the Mekong. (Synonyms are *S. c. sinlumensis* and *S. c. kauriensis*, Harington, Ann. Mag. Nat. Hist. ser. 8, 2: 246, 1908).

14. *Spelaornis chocolatinus kinneari* Delacour and Jabouille. Range: Chapa and Laokay, northern Tonkin, Indochina.—S. DILLON RIPLEY, *Peabody Museum Natural History, Yale University, New Haven, Conn.*

**Roosting Brown Creepers, *Certhia familiaris*.**—On the afternoon of February 27, 1949, Mr. and Mrs. Allen Benton and I observed two Brown Creepers coming in to roost along side the chimney of the house to the south of the home of Dr. and Mrs. Frank Studer, Schenectady, New York. At 4:15 p. m., both birds suddenly appeared low on the stucco siding and quickly ascended to the upper corner of the east side where the chimney meets the overhang of the roof. One bird flew up much of the distance. At this spot the remainder of a mud dauber wasp nest projects from the chimney and forms a partition parallel to the house wall. The creepers snuggled tightly into the nook thus formed; their toes were anchored to the chimney and their tails and bodies were pressed tightly against it. They pushed their bills straight up, into the wood of the roof. In this position they were motionless. We observed this performance with the Studers, from within their home and with 8 by 30 binoculars at a distance of 15 to 25 feet. The Studers say the birds have been roosting in this fashion, with slight variations, for over a month.—RUDOLPH H. STONE, 505 Bedford Rd., Schenectady 8, N. Y.

**House Wren, *Troglodytes a. aedon*, Utilizing Nest of Baltimore Oriole, *Icterus galbula*.**—A. C. Bent, in discussing the life history of the House Wren, states that there are three records of this species utilizing nests of the Baltimore Oriole (U. S. Nat. Mus. Bull. 125: 119, 1948). Another such nest was found in the yard of Mr. and Mrs. Maurice Hall of Victory, Cayuga county, New York, on July 27, 1948.

After a brood of orioles had been reared and had left the nest, the wrens took up occupancy. Their presence was first noted when the calls of the young attracted attention to the nest. It was located in the terminal crotch of a low-hanging branch of large-toothed aspen, *Populus grandidentata*, about 15 feet from the ground. The entrance hole used by the orioles had been covered with a thick interlacing of sticks, and the inside of the nest was well lined with chicken feathers. A new entrance which the wrens used was made in the side of the nest. The young were successfully reared in their swinging cradle and left the nest about August 10.—ALLEN H. BENTON, *Ira, New York.*

**A New Race of *Ænanthe ænanthe* (Linnaeus) from the Western Palaearctic Region.**—Recent investigation of western Palaearctic *Æ. ænanthe* has revealed that the populations inhabiting the mountain systems and moorlands of the western and northern parts of the British Isles are darker than the nomenclotypical race. On the basis of the constant nature of the racial criteria in the large amount of material before me I can see no other course open to me but to describe these extreme western populations as a new race.

***Ænanthe ænanthe integer*, new subspecies.**

**TYPE:** Adult male; in the Clancey collection. Moults almost completed. Collected on the boulder-strewn moorlands of North Knapdale, Argyllshire, southwest Scotland. August 7, 1948.

**MEASUREMENTS OF THE TYPE:** Wing, 95; culmen from base, 19.5; tarsus, 27.5; tail, 57 mm.

**DESCRIPTION:** Adult male in autumn nearest *Æ. æ. ænanthe* (Linnaeus), 1758, from Sweden, but darker and colder in tone above. Female, adult, in autumn, and first-winter male and female in the series have upper-parts darker and more earthen brown than in examples of the typical race; under-parts similar to *Æ. æ. ænanthe*. Male, adult, spring plumage rather darker and more bluish, less ashy, grey on upper-parts. Female, adult, spring plumage darker and more earthen brown in tone on upper-parts and somewhat duller and colder in tone on breast. Juvenile, darker both above and below than in typical race. Size as in *Æ. æ. ænanthe*.

**DISTRIBUTION:** Outer and Inner Hebrides, Northern Isles of Scotland, Scotland (mainland), and Ireland, as well as Pennine Chain and other montane regions of north-western England. ? Wales and Isle of Man. Essentially a moorland and mountain form. Replaced by populations referable to the typical subspecies on the heathlands and commons of southern and eastern England. Winters in Africa.

**MATERIAL EXAMINED:** *Æ. æ. integer*, all plumages, 63—all designated as paratypes and in the Clancey collection. *Æ. æ. ænanthe*, all plumages, approximately 400. Also material of the following races: *Æ. æ. leucorhoa* (Gmelin), 1789, Senegal; *Æ. æ. schiøleri* Salomonsen, 1927, Iceland. Mediterranean and Asiatic races were not studied.

**NOTE:** Attention is drawn to the fact that birds from the Outer Hebrides, western Scotland, are somewhat darker than the majority from the Scottish mainland, Ireland, and other parts of the range of *Æ. æ. integer*. On the basis of the large series before me I cannot see that it would be of any advantage to split the species further in the British Isles.

I tender my thanks to: the authorities of the British Museum (Nat. Hist.), London; Dr. J. M. Harrison, Sevenoaks, Kent; Lieut. Col. W. A. Payn, Andover, Hampshire; and Col. R. Meinertzhagen, London, for assistance in carrying out this investigation.—P. A. CLANCEY, *Cathcart, Glasgow, S. 4., Scotland.*

*Enanthe phillipsi* (Shelley) in Eastern Abyssinia.—Sclater ('Systema Avium Aethiopicarum,' 1930: 451) gives the known distribution of the Somali Wheatear, *Enanthe phillipsi* (Shelley), 1885, mountains near Berbera, as "British Somaliland (on the plateau); also recorded from Debbit (interior of Italian Somaliland)." This information would appear to be the present state of our knowledge of the distribution of this distinctive species.

During the course of a journey from Hargeisa, British Somaliland, to Mogadishu, Somalia (Italian Somaliland), in the company of Col. R. Meinertzhagen, I recorded this species from several localities in the southern Ogaden, Abyssinia. On March 5, 1949, I noted it as being quite common on suitable terrain in the upper valley of the Webi Shebeli. It was last noted at about the 300 kilometer mark on the military highway, north of Mogadishu.

This species favors low hills with sparse thorn scrub. It is a singularly undemonstrative species, rather "confiding" for a member of the genus *Enanthe*, but has all the other "engaging" mannerisms of the group. It perches very freely on and in trees and shrubs as well as on rocks, and does not seem to spend so much time on the ground as some other Wheatears.

The above records are the first for Abyssinian territory.—P. A. CLANCEY, *Cathcart, Glasgow, S. 4., Scotland.*

**A Name for the Dark, Western Populations of the Palearctic Whitethroat, *Sylvia communis* Latham.**—The Rev. J. M. McWilliam in his 'Birds of the Firth of Clyde' (Witherby, London, 1936: 52-53) quotes Eliot Howard and others in support of the view that the song of the whitethroat breeding in western Ireland and western Scotland differs appreciably from that of the English bird. McWilliam also draws attention on page 53 to the heavily blotched color of the eggs of western Scottish birds.

I have recently compared extensive material from many parts of the species' range in the western Palearctic and find that those from western Ireland and western Scotland and Isles differ sufficiently from the typical race to justify their separation under another name. In breeding dress they are slightly but constantly darker on the crowns, napes, and mantles, and have darker wings and tails. In the fresh autumn plumage the upper-parts are more earthen brown in tone, less reddish, than in the typical race from southern England and western European countries; this darkness is also very evident in juvenile birds, of which I have a good series in my collection.

As we must now recognize these extreme western populations of *S. communis* as a new race, it seems desirable to fix more precisely the type locality of *Sylvia communis* Latham (Gen. Syn. Suppl., 1: 287, 1787—ex Gen. Syn. II: 428, England). As Latham was for a great many years a medical practitioner in Kent we can perhaps fix the type-locality of his *S. communis* as Kent, south-eastern England.

*Sylvia communis cinerea* Bechstein, 1803, from Germany, is recognized by many German specialists. It can perhaps be retained to cover the slightly paler and grayer central and eastern European populations, but it should be noted that the color of the birds from the *terra typica* of *S. c. communis* (as designated above) is by no means constant, some birds from south-eastern England being almost as gray as German examples. The darkly colored populations from the extreme west discussed above are, however, separable in all plumages from *S. c. communis* in over 90 per cent of the specimens, and for them I introduce the name,

*Sylvia communis jordansi*, new subspecies.

This form is named in honor of my friend and colleague, Dr. Adolph von Jordans, Director of the Museum Alexander Koenig, Bonn, Germany.

TYPE: Adult male in breeding plumage; in the Clancey collection. Collected at Darnley, east Renfrewshire, south-western Scotland, on May 8, 1948.

DISTRIBUTION: Only certainly known from districts of western Ireland, the south-western, western, and central districts of Scotland, as well as the Inner Hebrides. ? Outer Hebrides. Winter quarters in Africa are not known.—P. A. CLANCEY, *Cathcart, Glasgow, S. 4., Scotland.*

**Blue-gray Gnatcatcher, *Polioptila c. caerulea*, in Sawyer County, Wisconsin.**—The afternoon of June 15, 1949, while setting mammal traps along Ghost River where it crosses highway 77 in Sawyer County, I disturbed a female Downy Woodpecker, *Dendrocopos pubescens*, which had young in a nearby stub. Her outcries drew an attack by a pair of Blue-gray Gnatcatchers. The following morning, I collected the male, the skin of which is in the Zoology Department, University of Wisconsin. The testes were 5 millimeters in length. Though the nest was not located, all indications are that the bird was breeding. The presence of this species in latitude 46°+ extends considerably the hitherto known range in the Upper Great Lakes region.—A. W. SCHORGER, 168 N. Prospect Ave., Madison, Wis.

**The Races of *Lanius souzae* Bocage.**—In his notes on a new race of Shrike, *Lanius souzae burigi* (Auk, 67: 241-242) which he has kindly allowed me to see before publication, Dr. James P. Chapin wrote that more material from Nyasaland, of which he had only a male available, should be examined and compared with skins from Angola, and that Nyasaland birds do not belong to this new race. The notes which follow supplement those by Chapin.

Due also to Dr. Chapin's kindness I have had the loan of this specimen from Nyasaland and of three males and three females from Angola, all in the American Museum of Natural History. I have also examined the following material in the British Museum: Angola, two females; Kasai, Belgian Congo, one female; Mumbwa, Northern Rhodesia, one male; Elisabethville, Belgian Congo, four females; Nyasaland and Furancungo, Portuguese East Africa, three males, five females; Uvinza district, Tanganyika Territory, one male, one female (these two also examined by Chapin, and identified as *L. s. burigi*).

Comparing the Nyasaland, Furancungo, Elisabethville and Mumbwa birds with the two from Uvinza, there is considerable individual variation within the former series. Several are scarcely separable from the Uvinza male, having just as little rufous on the lower back and little or no vermiculation; nor are they separable from the female, except that this latter is brownish on the crown and back, just as Chapin found in comparing it with a female from Lake Burigi. A female from Nyasaland and another from Elisabethville have the rufous on the posterior flanks just as extensive and bright. Consequently these more southern birds must also be attributed to *L. s. burigi*, at any rate until more material from Burigi or Uvinza, for example, is available. They are separable from those from farther west (Angola and Kasai) in much the same way as in Chapin's diagnosis of *L. s. burigi*, though some specimens are distinctly rufous brown on the lower back and vermiculated, but not so markedly, as in western birds.

The following measurements of wing and tail, in millimeters, illustrate a marked tendency to smallness, especially in wing-length, in the eastern part of the range of the species.

MEASUREMENTS OF *Lanius sousae*, IN MILLIMETERS

Locality or area	Number of specimens	Wing	Tail	Remarks
<i>L. s. sousae</i>				
Angola	12 males	84.0-90.0	81.0-90.0	Includes measurements of two males in the Berlin Museum, kindly provided by E. Stresemann, and those given by Chapin
	13 females	81.0-88.0	76.0-89.0	
Leopoldville, Belgian Congo	1 female	81.0	80.5	In Berlin Museum, as above
Kasai	1 male	81.0	78.0	
<i>L. s. burigi</i>				
N. W. Tanganyika Territory and E. Ruanda	1 male	86.0	89.0	As per Chapin
	1 female	81.0 (+ 3)	79.0	
Uvinza	1 male	83.0	80.0	
	1 female	83.0	81.0	
Mumbwa	1 male	87.5	81.0	
Elisabethville	4 females	80.0-83.0	75.0-83.0	
Nyasaland and Furancungo	7 males	79.0-84.0	79.0-86.0	Includes measurements of three males and one in Transvaal Museum, kindly provided by M. J. Toerien
	6 females	80.0-82.0	80.0-82.0	
Ugano, southern Tanganyika Territory	2 males	79.0-80.0	69.0-71.0	See Ann. Naturh. Mus. Wien, 51: 244, 320, 1941. Kindly measured by M. Sassi.
	3 females	78.0-80.0	68.0-80.0	

A juvenile from Kasai, in the British Museum, has the whole upperside, including the crown and nape, vermiculated on a rich rufous brown, as on lower back of adults of *L. s. sousae*. The underside is similarly vermiculated, though the throat and center of the abdomen are less heavily so.—C. W. BENSON, c/o *The Secretariat, Zomba, Nyasaland*.

*Vireo solitarius* in Honduras.—A number of bird skins, taken by the well known collector, C. F. Underwood, were recently obtained by the Academy of Natural Sciences of Philadelphia from the Republic of Honduras. Included is an example of one of the Central American forms of the Solitary Vireo from La Flor, Archaga, approximately 12 miles north of Tegucigalpa. The specimen, a male, was collected on June 8, 1937, and has the following measurements: wing (maximum measurement) 65.5 mm.; tail, 45 mm.; exposed culmen, 9.5 mm. The bird is immature, which doubtless accounts for its small size. It cannot be identified subspecifically but is probably referable to *montanus* van Rossem, of Guatemala and El Salvador, rather than to *notius* Van Tyne, of British Honduras.—JAMES BOND, *Academy of Natural Sciences, Philadelphia, Pennsylvania*.

**Cuban Golden Warbler, *Dendroica p. gundlachi*, on Florida Keys.**—On June 13, 1948, the writer and Mr. Wray H. Nicholson observed two singing males of the Cuban Golden Warbler in the mangroves near the highway on Ramrod Key, Florida. This bird was first discovered on June 15, 1941, on one of the Bay Keys, off Key West, by Roger T. Peterson and Earle R. Greene; on June 28, 1944, a nest was found by these observers at the same location. This marked the first recording of this species in the United States (Auk, 59: 114, 1942). Mr. Greene again observed individuals of this species on the Bay Keys and Big Mullet Key in June, July, and August, 1942 (Auk, 61: 304, 1944).

On June 14, 1948, we saw two more of these birds, both in song, in mangroves near Raul's Club, Key West. A search for a nest resulted in failure. Returning homeward on June 15, we observed another Golden Warbler in the mangroves off Perky, Sugarloaf Key. Later in the day, the birds were again seen on Ramrod Key and were heard in the same locality, indicating probable nesting birds. Since Ramrod Key is about 27 miles from Key West, the indications may be that this bird is extending its range along the keys. There seems to be little doubt that it has become a regular summer resident on the lower Florida keys.—ROBERT F. MASON, JR., *Maitland, Florida*.

**Nesting Black-throated Gray Warblers, *Dendroica nigrescens*, East of the Rocky Mountains.**—On May 30, 1949, we observed three male and two female Black-throated Gray Warblers at an altitude of about 7,000 feet in an open woods of small piñon pines and cedars on one of the low ridges formed by intrusive volcanic dikes east of Dike Mountain, Huerfano County, Colorado. This area is west of Walsenburg and north of the La Veta Pass highway and is noteworthy in that it is east of the Rocky Mountains, 100 miles east of the Continental Divide, and thus east of the usual range. On June 11, we returned and located in pine trees two of their feather-lined nests about seven feet from the ground; one nest contained two fledglings and the other three gray eggs speckled with brown.—JULIA W. AND ROBERT M. ARMAGAST, *Adams State College, Alamosa, Colorado*.

**A Western Meadowlark, *Sturnella neglecta*, in Alabama.**—At Fort Morgan, Alabama, on March 19, 1949, I heard a song which was instantly recognizable as that of the Western Meadowlark, familiar to me through past field experience and from hearing recordings of it. The bird flew from bush to bush in the open area bordering the salt marsh just south of the Fort. I was unable to approach closely enough to collect it, but during these efforts, the bird occasionally uttered call notes which corresponded to certain notes of the eastern species, yet were noticeably different. With 10-power glasses the paler color of the back could easily be discerned, and the black 'V' appeared to be suffused with gray. The father of the lad who loaned a gun to me recognized this bird to be different from the "field lark" of his acquaintance and remarked that it looked larger, but this I could not definitely ascertain.

Although recorded previously as far southeast as coastal Georgia (Helme, Auk, 21: 280) and coastal Mississippi (Burleigh, 'The Bird Life of the Gulf Coast Region of Mississippi'), this appears to be the first record of the Western Meadowlark in Alabama.—HENRY M. STEVENSON, *Department of Zoology, Florida State University, Tallahassee, Florida*.

**Adjustment to Environment by Blackbirds, *Euphagus cyanocephalus*.**—Bird books say that Brewer's Blackbirds nest in thick trees. On May 24, 1949, on the Bailly Wildlife Refuge near Reno, Nevada, the writer observed a pair of black-



birds which had made a nest in an abandoned mine shaft. Just below the top of this shaft, rising and lowering water had hollowed out a bowl-like excavation, on the under section of the top part of which the blackbirds had made a nest in a tunnel under a rock. No animal or human could reach it and no bird could see it from above.

The blackbirds perhaps used this device to adapt their nest to an environment in which it was threatened by more than one kind of hawk which used adjacent pine trees—the only trees for a mile or more in any direction. These birds made themselves safe from predators by changing their tree-nesting habits to one more like that of a Bank Swallow.

They were secure at least until their young were ready to fly. Whether the young will be able to fly upwards when they leave their nest, or how the parents will save their brood from being drowned in the water in the bottom of the shaft or sump, is uncertain.—FISHER C. BAILY, *Reno, Nevada*.

**A Summer Tanager, *Piranga rubra*, Annihilates a Wasp Nest.**—In November 10, 1948, I saw one female Summer Tanager destroying the nest of large red hornets. The events were as follows: At 9:30 a. m. my attention was attracted toward an active tanager on a tree some ten meters from my work room in the museum.

The nest of hornets was long and uncovered externally. With my binoculars I could plainly see the pupae and larvae of the wasps. The bird was making short flights from a branch some three meters from the hornets. In each flight the bird grasped with its bill a hornet from the nest. The angry insects followed the bird a short distance. Once on its perch or on any twig not far from the wasps, the tanager triturated the insect and swallowed it. An instant later the bird was making other flights and capturing other hornets, and so on and on all morning.

Sometimes the tanager could not capture the wasp in passing near the nest, but as the insects rushed after the bird it would turn suddenly, grasp one of them and dive to escape the insects. It would then return promptly and take another hornet. The bird did not always swallow the insects; many times it merely killed the hornets and dropped them to the ground which soon became covered with many dead hornets.

All this continued, with only occasional resting periods for the bird until about noon when, after an attack from the tanager, the hornets suddenly *en masse* deserted the nest. Promptly the bird alighted on the nest and gorged on the larvae and pupae and caught any hornet that approached the nest. At 1:30 p. m. the bird flew out of sight and I had to go to lunch, but on my return at 4:00 p. m. I was surprised to see that the hornets had returned to the damaged nest. The bird was not within sight and did not return all afternoon.

I concluded that the tanager was through with these hornets, but the following morning it came back punctually at 9:00 a. m. and once more I found myself witnessing the same interesting events. This time, however, the hornets withstood the bird only until 10:45 a. m.; at this hour the remaining insects deserted the nest. The tanager once more alighted on it, swallowing the pupae and larvae left the previous day and tearing to pieces the damaged hornets' nest.

Was the tanager merely eating the adult insects or was its interest focused on trying to force the adult hymenoptera away so that it could feed on the tender young?—MIGUEL ALVAREZ DEL TORO, *Museo de Historia Natural, Tuxtla Gutiérrez, Chiapas, Mexico*.

**Winter Courtship Display of Female Cardinal, *Richmondia cardinalis*.**—We have outside our window a feeder used by a pair of Cardinals, as well as other birds. On February 16, 1949, my wife called me to the window to look at the

fluttering of a female Cardinal. She was in a squatting position with crest erect and wings and tail outspread with wings fluttering and beak raised. As we watched, the male flew up and alighted about two feet from her. She then stood upright and slowly swayed back and forth sideways, in the meantime displaying the red portions of her plumage. At the extremity of each sway, she would hold her pose for a moment. The latter part of the display was accompanied by a "whispered" song on her part. Although the song was very faint, her throat could be seen working. The song was a whistled 'chew-chew-chew.' The male in the meantime showed a lively interest and looked down into the feeder, as though possibly searching for a suitable seed to feed to her. He then flew off in the midst of her posturing, and she immediately followed.

Although the temperature was about 38° F., the day was cloudy and far from springlike which might otherwise account for this behavior.—F. J. FREEMAN, *Itasca, Illinois*.

**First Winter Occurrence of Painted Bunting, *Passerina ciris*, in South Carolina.**—Due to the extremely unseasonable warm weather of January in much of eastern United States, it is probable that extraordinary instances of avian occurrence will be reported. The writer has obtained, thus far, the first winter record of *Passerina ciris* for South Carolina.

On January 27, 1949, Mrs. Gertrude Miles and her husband, of Pineola Plantation, McClellanville, S. C., saw two males of this species about 15 miles north of Charleston on U. S. Highway 17. The birds were at the shoulder of the road, in bright sunlight at a range of a few yards. Mrs. Miles is a native of the Carolina low country and has been familiar with the "nonpareil" since childhood. The high temperature of the day was 78° F.

The Painted Bunting usually arrives in Charleston about April 16, and the earliest record, hitherto, was March 21. The writer is indebted to Mrs. Miles for making this occurrence known.—ALEXANDER SPRUNT, JR., *The Crescent, Charleston, South Carolina*.

**Carpodacus Finches Feeding on Nectar.**—During the flowering season of the various domestic cherries in the Willamette Valley of western Oregon, the Purple Finch, *Carpodacus purpureus*, becomes an agricultural pest that at times assumes considerable importance. Flocks of these finches can destroy a large number of flowers in a few hours' feeding. Single trees about residences seem to suffer most severely, but extensive damage has been observed in several commercial orchards.

The birds pick a blossom from its peduncle, crush and maul it in their bill, and then drop it. Examination of many flowers has revealed a uniform pattern of feeding, there being no part of the flower missing, but rather the receptacle and base of the calyx and corolla are thoroughly crushed. Since there is no preliminary examination of the flowers, and a single bird will pick each flower within reach as it moves up or down a limb, it seems certain that these finches are extracting the small quantity of nectar present in the flower. When this behavior was first noticed I hoped to find that these finches were feeding upon small insects present in the flowers, but subsequent investigation did not substantiate this belief.

Beal (Yearbook U. S. Dept. Agr. for 1904: 247) noted that White-crowned Sparrows, *Zonotrichia leucophrys*, and House Finches, *Carpodacus mexicanus*, destroyed numerous blossom buds. Later, Beal (U. S. Biol. Surv. Bull. no. 30: 15, 1910) stated that both House Finches and Purple Finches destroyed "buds and blooms of fruit trees instead of the fruit itself." He further remarked (*op. cit.* 16) that he found

little evidence of fruit blossoms in the stomachs of House Finches and concluded: "It is probable that but little of the alleged mischief to fruit blossoms is done by this bird." This lack of evidence is of course due to the birds' practice of dropping the blossoms after crushing them. Beal suggested that this type of feeding was restricted to domestic fruit trees, which may not be entirely true.

On July 26, 1948, I observed at least three Cassin Finches, *Carpodacus cassinii*, feeding on the flowers of the delicious blueberry, *Vaccinium deliciosum*, in subalpine meadows on the northeast side of Mount Rainier, Washington.

In the area around Eugene, Oregon, the Evening Grosbeak, *Hesperiphona vespertina*, feeds regularly upon the flowers of the broad-leaved maple, *Acer macrophyllum*, during the early spring, much in the same manner as the Purple Finch feeds upon cherry blossoms.

These observations suggest that nectar feeding may be wide-spread among species of *Carpodacus* in North America, and perhaps in the finch subfamily Carduelinae.—GORDON W. GULLION, 5400 Huber Ave., Richmond, California.

**Bird Cooperation in Time of Danger.**—Emerging from a thicket of white pines into a small clearing one day in late June, 1947, in a mountain valley near Linville Falls, North Carolina, I heard a noisy commotion among several species of birds. A number of sparrows could be seen on the ground, flying up and jumping around. Through my binoculars I could see Chipping Sparrows, *Spizella passerina*, and Field Sparrows, *Spizella pusilla*. In the nearby shrubs the Cardinals, *Richmondia cardinalis*, Bluejays, *Cyanocitta cristata*, Mockingbirds, *Mimus polyglottos*, Catbirds, *Dumetella carolinensis*, and others were crying out, flitting from shrub to shrub and flying low over the spot. The cause of this was soon noticed, a six-foot black snake, *Coluber constrictor*, was after baby Chipping Sparrows on the ground. The adult Chipping Sparrow was tumbling within inches of the snake's mouth, and the snake was striking at the mother bird, but missing each time. Other Chipping, Field, and Song Sparrows, *Melospiza melodia*, were going through the same antics, and all the time the snake was being led away from the baby sparrows. The birds mentioned above were also cooperating in leading the snake away. I watched this for a half-hour and by this time the snake was about 15 feet from the young sparrows. I entered the scene and the snake left.—DAVID L. WRAY, 510 Dixie Trail, Raleigh, N. C.

**The Seabirds of Soemoe Soemoe and Vicinity, Northern Moluccas.**—From June 5 until September 13, 1945, Richard Bowen of Warren, Rhode Island, and I were stationed on Soemoe Soemoe, one of the reef islands fringing the coast of southwest Morotai. Soemoe Soemoe lies two miles west of the southwest coast of Morotai and ten miles east of the northern tip of Halmahera at approximately two degrees north latitude. From this base we patrolled the east and west coasts of northern Halmahera. The following is an account of the observations made over this entire area. Both land and seabirds were noted, but only the latter will be included in this paper since the landbirds of the region are well known. As references while we were in the area we used Mayr's 'Birds of the Southwest Pacific' (1945) and Alexander's 'Birds of the Ocean' (1928). I also wish to express our indebtedness to Dr. Mayr and Dr. J. T. Nichols of the American Museum of Natural History for their assistance.

The climate of the region is tropical with relatively mild and predominantly south-westerly winds, usually from five to seven knots. Most of the area covered here was on the lee side of the mountains of Halmahera, which tended to protect it from storms. Evening rains were the rule, but they were usually of short duration. On August 14, however, there was a severe storm with flooding rains and relatively high winds,

which is referred to later in this paper since the great amount of debris it washed from Halmahera into the Galela Bay area attracted many seabirds.

The Wedge-tailed Shearwater, *Puffinus pacificus*, is the commonest shearwater, being most frequently seen in Galela Bay, Halmahera. On August 15, after a severe storm, there was a great deal of debris in the water, and these shearwaters were present in great abundance. A Bulwer's Petrel, *Bulweria bulwerii*, was seen perched on a floating log off Halmahera, first on August 19, and several times after that. The Dusky Shearwater, *Puffinus lherminieri*, was not considered common, although we saw it fairly often, especially on August 15 off the coasts of Halmahera and Morotai. Wilson's Storm Petrel, *Oceanites oceanicus*, was seen just north of the Talaud Islands on September 13. Only adult Brown Boobies, *Sula leucogaster*, were seen in this region, but they were relatively common, especially in the region of Galela Bay. The Greater Frigate Bird, *Fregata minor*, was quite common around Morotai and the fringing reef islands. There was no indication that the birds were breeding here, although immature and adult male and female birds were seen. During July, they were seen daily, circling in large flocks over the barrier reef of Morotai. In August and September they disappeared completely, and Lesser Frigate Birds took their place. The flocks of both species were estimated to have well over 100 birds. A few Lesser Frigate Birds, *Fregata ariel*, were seen in early June, then not seen again until August and September when they were common. Immature individuals were seen, although again there was no evidence of breeding here. The Roseate Tern, *Sterna dougallii*, was the commonest white tern in the region of Halmahera and Morotai. Sooty Terns, *Sterna fuscata*, were often seen off Halmahera (Galela Bay and south). Brown-winged Terns, *Sterna anaetheta*, were relatively common in this region, particularly near Galela Bay. The supercilious streak was distinctly seen, though faint, extending well beyond the eye. The Spectacled Tern, *Sterna lunata*, was seen uncommonly off Halmahera; it was identified from a collected specimen. Some adult and many immature Crested Terns, *Thalasseus bergii*, were seen off Halmahera in the region of Galela Bay and also perched on the beach. The crest was partly raised when perched, down when in level flight, and raised when diving. The Common Noddy, *Anous stolidus*, was fairly common off Halmahera, during August and September, where it was perched on floating debris (logs, coconuts) and flying. The Whimbrel, *Numenius phaeopus variegatus*, was the only shorebird seen on Soemoe Soemoe or Halmahera.—JOHN J. CHRISTIAN, 12 Roseland Ave., Philadelphia 11, Pennsylvania.

**Notes on the Birds of Guam.**—In these notes emphasis is placed on habits, dates, and island distribution. An occasional field mark is offered for corroboration of identification or as an aid to future observers. Dates cited are a record of field trips more than of the occurrence of a species, since notes were not made with regularity.

Observations were made from December, 1945, to July, 1946, primarily in the Agat-Mount Tenjo-Piti-Orote Peninsula area and the Tumon Bay region. One trip was made across the center of the island to Talafofo Bay on the southeast coast, one to Northwest Field near Ritidan Point, and one down the west coast by boat to Cocos Island. Due to Navy regulations all trips were necessarily taken between the hours of 1 and 7 p. m.

**CHINESE LEAST BITTERN, *Ixobrychus sinensis*.**—Common in the region of Apra Harbor, seen in the mangroves, mudflats, marshes and swamps. The call is a harsh 'chalk.' Their flight is distinctive. The forward motion through the air appears slow compared to the rapidity of the wing beats. In flight, the secondaries appear

bluish-white, in contrast with the blackish primaries and pale, rusty back. On June 22, a pair was in the swamp by Agat Bay. One was pale, almost colorless; the other was richer, having more brown in the plumage and also some streakings on the neck and breast.

MARIANNAS MALLARD, *Anas oustaleti*.—In the same swamp mentioned later in connection with the Gallinule, three birds (one a male) were usually seen feeding. During the months of May and June, when the swamp was almost dry, they were absent. On June 22, one was seen and on July 2 and 4 the three adults were again present.

PIGMY QUAIL, *Excalfactoria chinensis*.—Seen in the foothills on the western side of Mt. Tenjo in dry grassy areas. On June 16, two young and three adults were flushed 10 feet ahead of the observer. One young was caught; it was one and one-half inches long, with blackish down. When flushed these birds were usually silent, but occasionally a timid 'keek-keek-keek' was heard. They fly 50 to 75 feet before alighting. In five of the six times I have flushed this bird it has been on the lee side of a hill. The wind in this region at this time of year usually blows at 20 to 25 miles per hour from an easterly direction.

GUAM RAIL, *Rallus owstoni*.—Common in the Tumon area and seen three times along the road by the Atantano River east of Apra. It is found in the forests and shrubbery and is more often heard than seen. By noting its frequent calls (when disturbed) it could be approached closely, but even then it was difficult to see, for it was very elusive. At Tumon, on June 22, I saw six individuals in a square mile. The call is characteristic; it ranges from the alarm call, a loud explosive 'keeeep' to a soft 'keeeep' that sounds like a young chicken. The call was usually heard before I was 30 feet from the bird or not until after I had passed it. When excited, they dash into the undergrowth uttering little 'keeeep's.' Sometimes they give forth an excited series of 'kick's' or 'kitty's.'

GALLINULE, *Gallinula chloropus*.—I saw this bird only in an open, flooded mud-flat with several islands of green grass in it, about half a mile inland from Agat Bay. The height of the water fluctuated with the rainfall. The number of birds visible varied, but throughout the eight months there was always at least one pair present and usually more, feeding in the debris of last season's vegetation or on the dry, caked surface of the higher parts of the flat. The call is a barnyard cackle. On June 30, four immatures were feeding in the center of the area. One adult was feeding two half-grown birds and a pair was engaged in building a nest. They had chosen a moist piece of earth approximately 10 by 40 feet, sparsely covered with grasses and sedges. One bush stood two feet high in a clear area, but water covered its base. One bird remained in this bush on the beginnings of a nest while the other ran rapidly back and forth carrying grasses to it. The bird sitting on the nest fitted the material into place. It was very persistent in its actions. The birds exchanged places about every 20 minutes.

GOLDEN PLOVER, *Pluvialis dominica*.—Five were seen on June 30; four were feeding in a coral tidal pool by Apra on July 3.

RUDDY TURNSTONE, *Arenaria interpres*.—It was usually seen in a mud-flat inland from Agat Bay or on the flats along the bay. First seen on March 6, there were seven on June 20, three on June 22, and a pair at Agat on July 4. During the months of June and July they were seen more often than the above dates suggest.

WHIMBREL, *Numenius phaeopus variegatus*.—Seen occasionally along the beaches, mangroves, and mudflats from Agat to Tumon from December to May and regularly from May to July. Their flight is suggestive of the slow, over-head strokes of a



gull. They glide to earth on bowed, outspread wings. The call is a loud emphatic 'cuk, cuk, cuk, cūk, cūk, cūk, cūk, cūk,' delivered in flight or at rest.

COMMON SANDPIPER, *Actitis hypoleucos*.—One seen along Agat beach July 4.

FAIRY TERN, *Gygis alba*.—These birds were not common but were fairly regular in occurrence.

COMMON NODDY, *Anous stolidus*.—At all times these birds could be seen flying about the cliffs at Orote Point or working over the ocean near by. A cluster of about 20 were flying off Bangpi Point on May 25. There were approximately 60 off Orote that day. I never saw them dive from a height. They made sorties out from the cliff, following closely the troughs in the waves. On March 29, during a typhoon of three days' duration, the terns were forced to retire to a relatively sheltered area on the lee side of Cabras Island. Despite the winds, they maintained their position over the water in search of food. This was the only time I saw them away from Orote Point.

MARIANNAS FRUIT DOVE, *Phalinopus roseicapillus*.—They call frequently. The call is a resonant 'gook,' rhyming with cook. It is repeated with acceleration until it becomes a gurgling sound and then slows down to the original speed. The performance takes five or six seconds.

PHILIPPINE TURTLE DOVE, *Streptopelia bitorquata dusierei*.—One of the commonest birds present, usually seen in pairs. The call is a 'cook coo-cooo.' On March 2, a dove was seen carrying a twig. On April 12, a flimsy nest was found in the forest edge at Tumon; it was 15 feet from the ground and contained two white eggs. On April 13, another nest was found at Tumon, containing two white eggs in a low bush ten feet from the ground and ten feet from the ocean's edge. A peculiar performance observed both on Guam and Saipan consisted of an ascent into the air at a 40-degree angle of about 25 feet. At this height the bird suddenly dropped to one side, wheeling on stiff, outstretched wings to the branch again; while rising the wings snapped loudly with each beat.

WHITE-THROATED GROUND DOVE, *Gallicolumba xanthonura*.—Seen fairly often in the Tumon forests, once near Agat, and occasionally making relatively long flights 200 feet in the air. Because of these long flights, I think their feeding grounds may be widely scattered. They are definitely forest birds.

MICRONESIAN KINGFISHER, *Halcyon cinnamomina*.—These kingfishers were not numerous, but they were seen regularly, almost always in pairs. On April 6, a pair was seen in a patch of woods one mile inland from Agat Bay. Also on April 6 an immature was present; it was fully feathered and could fly a little. It persistently called 'aaa-aaaa' (rhyming with 'baaa' of the sheep, accent on the last syllable). The adults fed it once during the 30 minutes that I watched. Twice they chased a band of Starlings away from the immature.

NIGHTINGALE REED WARBLER, *Acrocephalus luscini*.—I didn't find this bird until June 3. At least three individuals were singing in a broad expanse of cane grass or in nearby mimosa thickets along the Atantano River below Mt. Tenjo. The song lasts four to five seconds with a five to six second interval and is catbird-like but not as slurred; there are fewer 'hicks.' Sometimes the calls are repeated, after the fashion of the Brown Thrasher. On June 20, these warblers were still singing in the area.

RUFous-FRONTed FANTAIL, *Rhipidura rufifrons*.—In the shrubbery and thickets (especially mimosa) on all parts of the island these birds were present. Their feeding actions were more like an energetic warbler's than a flycatcher's. They continuously



flit about the mimosa thickets chasing insects. On June 16, a fully fledged immature was being fed.

MICRONESIAN BROADBILL, *Myiagra oceanica*.—Seen regularly in mimosa thickets inland from Agat Bay in the mangrove-shrubbery vegetation to the island edge of Apra Harbor, and at Tumon Bay. Its calls vary: a husky 'zip-zip-zip-zip-zip,' a harsh husky 'bwee-it, bis,' and a soft titmouse-like 'per-per.' It responds to squeaking and the crest is raised when excited.

MICRONESIAN STARLING, *Aplonis opacus*.—Very common throughout the island, noisy and gregarious. The call is an oriole-like 'jeep' or 'ja-leep.' They frequently feed on insects in dead trees or on the breadfruit or papaya plant. Streaked immature birds were present during all eight months of my stay. On January 8, a pair was taking turns flying to the top of a dead coconut tree, dropping inside, remaining there for five minutes (during which time the mate remained in a nearby tree) and then leaving. I saw no food in their bills. On February 4, I noticed similar actions at another tree. The first pair was still active at its tree. In both cases, one bird remained by the tree while the other was gone. On February 13, both pairs were still active at the nests; a pair was mating, and another bird carrying a twig. On May 5, after the first stump had been deserted for at least a month, a bird was seen carrying a twig into it.

GUAM CROW, *Corvus kubaryi*.—I saw this bird occasionally in the Tumon area, in coconut trees or in the taller trees of the forest. No more than five individuals were seen together at one time. The call is like the American Crow's, but is higher pitched and more nasal.

CARDINAL HONEY-EATER, *Myzomela cardinalis*.—This was a common bird in the more open growth of inhabited areas. A canary-like call, 'bweet' was uttered all day long. Their song, a simple melodious 'per-mil-you' was heard most often in the early morning. At 5 a. m. on June 20 five birds were singing within a 500-foot radius in the mangroves. A fully fledged young was being fed by a female on December 9 and on April 13.—LEWIS F. KIBLER, 721 Hastings St., Pittsburgh, Penn.

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#### NOTES AND NEWS

##### CHAPMAN MEMORIAL FUND

THE biographical account in this issue of 'The Auk' of the late Dr. Frank M. Chapman makes it timely to refer again to the fund in his memory sponsored by the American Museum of Natural History. In April, 1950, this totalled approximately \$37,000, all of which has been invested. As soon as the capital assets reach \$50,000, or perhaps before, it is proposed to expend the annual income in support of ornithological research.

Admirers of Dr. Chapman may contribute by drawing checks to the "Chapman Memorial Fund" and sending them to the American Museum of Natural History, Central Park West at 79th Street, New York 24, N. Y. Contributions are deductible under the Federal Income Tax regulations, and small gifts are welcomed. Upon request, the Museum will supply inquirers with a circular of information about the fund and the uses to which the income will be applied.

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In these times of high costs of publication (and often reduced incomes from invested funds), many organizations are having difficulty in carrying on their publications. This is particularly true in ornithology where the interest has increased so

greatly in the last decade. Therefore, manuscripts must be worked, reworked, and "polished" until the necessary and desired information is presented in the clearest and most concise manner possible. Extraneous references to the literature should be omitted; quoted material should be held to a minimum. Also of concern to editors is the duplication in which manuscripts are simultaneously sent to more than one journal and even published in two different periodicals; repetition such as this is a waste of our limited funds and may prevent the appearance of original material.

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THE sixty-eighth stated meeting of the American Ornithologists' Union will be held October 9 to 13, 1950, at Minneapolis, Minnesota. Hosts for the meeting will be the Minnesota Ornithologists' Union and the University of Minnesota. Public sessions will be held October 10 to 12, 1950, at the Minnesota Museum of Natural History on the Minneapolis campus of the University of Minnesota. Headquarters hotel will be the St. Paul Hotel, 363 St. Peter St., St. Paul, Minnesota. Special attention is called to the fact that the annual banquet will be held at the Coffman Memorial Union ballroom on the University campus on Tuesday evening, October 10. It has been customary in the past to have the banquet on a Wednesday night. Dr. W. J. Breckenridge of the Museum of Natural History is chairman of the Local Committee on Arrangements.

Titles of papers and motion pictures for presentation at the meeting must be in the Secretary's hands not later than September 1. The title of each paper must be accompanied by a brief abstract of the paper's contents and a statement concerning the time desired for delivery and the kind of projection facilities needed, if any. The title of each motion picture should be accompanied by a brief description of the film's subject matter and a statement concerning the total footage and the time required for projection and commentary.

Papers and motion pictures submitted for presentation will be reviewed by the Committee on Communications. Abstracts of papers chosen for presentation will be mimeographed and made available at the meeting. It is important, therefore, that all abstracts be carefully prepared by the authors.

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THE Wilson Ornithological Club held its thirty-first annual meeting on April 28 and 29, 1950, at the State 4-H Camp, Jackson's Mill, West Virginia. Attending the meeting were 320 members and guests from 19 states and one province of Canada. Twenty-six papers were presented during four half-day sessions.

This meeting was unusual and particularly enjoyable because it was held in a beautiful rural setting among the West Virginia hills. Early spring flowers were blooming and leaves were beginning to emerge on trees and shrubs. Pileated and Red-bellied Woodpeckers were nesting within a stone's throw of the meeting hall, and the Carolina Wren and Bachman's Sparrow were singing nearby. Each dawn and each intermission between sessions was an invitation to a field trip right on the camp grounds.

Maurice Brooks succeeded Olin Sewall Pettingill, Jr., as President of the club. David E. Davis resigned as editor of "The Wilson Bulletin," and George M. Sutton was elected to this position effective with the issue of September, 1950.

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WORD has been received of the death of H. B. Conover in Chicago on May 5, 1950. LOUIS B. BISHOP passed away on April 3, 1950, in Pasadena, California, at the age of 50.

### RECENT LITERATURE

**South Carolina Bird Life.**—Sprunt, Alexander, Jr., and Chamberlain, E. Burnham. Edited by E. Milby Burton, Director of the Charleston Museum. (Univ. South Carolina Press, Columbia), pp. xiv + 583, 35 col. pls., 48 photos, 1949. Price \$10.00.—The appearance of this handsome volume marks the latest milestone in the progress of ornithology in South Carolina and the Southeast. The section "Ornithology in South Carolina," pages 1 to 27, impresses the reader with the fact that this state, especially the coastal section, is classic ground in American ornithology. Beginning with Mark Catesby in 1722 (earlier writers mentioned birds, but were more historians than ornithologists) the list of early workers on the birds of the state include such great names as Bartram, Wilson, Audubon and his friend Bachman, Coues, Merriam, Loomis, Wayne, and Brewster. The list of recent and contemporary bird students who have visited and made bird observations in the state reads like a "WHO'S WHO" of modern ornithology and adds much to the interest of this section of the work. A host of others, including the authors and the editor of this book, have played a great part.

The present publication is built on the firm foundation of Wayne's 'Birds of South Carolina' of 1910, which likewise marked a milestone in southeastern ornithology. In 1931 the present authors brought information on the bird life of the state up to date in 'The Supplement to Wayne's Birds of South Carolina,' published by the Charleston Museum. Sprunt and Chamberlain were coached and started on the ornithological road by Wayne. Both are lifelong members of the active resident group of bird students of the state and were highly qualified for their task.

Due to the fact, however, that by far the greater amount of field work has, from the first, been carried on in the "Low-country," knowledge of the birds of the coastal section is much more extensive than that of the other great natural divisions of the state, or the "Up-country." However, the latter has had several competent workers: Hoxie in the southeastern part of the state; Murphey in the Savannah River section near Augusta; Tomkins at the mouth of that river; and the early observations and collecting of Leverett Mills Loomis contribute much to balance.

Seven pages are devoted to "The Region," and a careful perusal of this section is essential to an understanding of bird distribution in the state. Five pages "On Studying Birds" are important reading for beginners in bird study, while "old timers" will enjoy it. These sections, as well as the extensive series of "Histories," are in the reviewer's opinion exceedingly well written and full of keen observations. A mastery both of writing and field ornithology is plainly evident.

The treatment of species and subspecies is uniform. After the name comes a line giving the Latin or Greek derivation of the technical names. There follows in abbreviated form—"Description," "Range," and "Status in South Carolina"—in small type and taking little space, but adequate in a work of this kind. Next comes the "History" which occupies from a quarter of a page, in the case of rarities, to two or more pages in many others. In the case of species widely distributed over the state, the known range is delimited by counties, following in principle the method of the A. O. U. Check-List with larger political divisions. This is perhaps the best presentation for South Carolina bird students with a clear mental picture of the location of the counties of their state; it proves somewhat inconvenient for others, for it makes necessary constant reference to a small map, with very small type. For use of outsiders, a brief statement of status in the Coastal Plain, Piedmont, and Mountain sections would have simplified understanding of distribution.

Under "History" lies the unique and outstanding value of the work to bird students interested in the ornithology of the eastern and southern states. For the first time an adequate series of life history sketches of birds of a typical southeastern state has been made available in a single volume. It is a splendidly written account of the habits and behavior of birds living under southern conditions. This is in striking contrast to most bird books dealing with the Southeast, which have been largely compilations by out-of-staters, with comparatively little year-around field experience in the regions covered.

The authors write with perhaps undue assurance as to certain species being "two brooded," "three brooded," or "four brooded," or as "rearing" such multiple broods. An example is the case of the Bachman's Sparrow. Not in a spirit of criticism, but rather speculation, the reviewer wonders what the verdict will be when the birds in question have been investigated as intensively as the Song Sparrow, the House Wren and the Bob-white. Nesting attempts of small ground nesting birds are fraught with so many dangers that they are lucky to "rear" one brood after long-continued nesting attempts. Be that as it may, the present authors had to be sparing of qualifying words if their material was to be presented in one volume. One has in any case to take with mental reservations statements dealing with this phase of avian reproduction in most bird books of our day.

Due to the extensive collecting, especially of an earlier day, there are a great many study skins of South Carolina birds in the Charleston Museum (the oldest natural history museum in America) and elsewhere within and outside the state. These were carefully worked over by Dr. Harry C. Oberholser, and the matter of occurrence of subspecies brought up to date.

Four hundred and forty-two species and subspecies of birds are treated in the regular list, and 17 in the "Hypothetical List." Had the authors followed traditional custom, some 15 carried on the regular list would have been considered hypothetical until specimens are collected in the state. One of the greatest departures from usual practice is the assigning of trinominals to the Burrowing Owl in the absence of a specimen in hand. It is arbitrarily listed as the Western Burrowing Owl on the ground that the Florida race "is not known to be migratory." While the probability is in favor of the assumption being correct, it is a probability only. An article in 'The Auk' (63: 451, 1946) illustrates this. Re-examination of a specimen first determined as a Western Burrowing Owl, that was collected 50 miles west of Pensacola, Florida, was found to be a Florida Burrowing Owl. The points of capture or observation of the two specimens are approximately equidistant from the center of abundance of the Florida race. A sight record of the Burrowing Owl in Georgia is carried on the *Hypothetical List* under *binominals*. With such a real difference of opinion as to what should or should not go on a State List, it might be helpful in getting uniformity for the A. O. U. to appoint a representative committee, similar to its important Committee on Classification and Nomenclature of North American Birds, to lend a guiding hand. The unorthodox handling of this matter in the present work of course in no way detracts from its usefulness.

The colored plates (11 by Jaques, 10 by Peterson, 11 by Dingle and 4 by Dick) are superb and well reproduced, with one or two exceptions. The photographs are also of exceptional beauty, and the illustrations add much to the value and beauty of the volume. The book as a whole is splendidly gotten up, and it was quite a feat to present successfully such a mass of material in a single volume of convenient size. It is well indexed, and few typographical errors were noted in a careful reading. One, on page 5, giving Audubon's arrival in Charleston in 1931, is unfortunate.

The authors, editor, the publishers, and all others who labored on this book are to be congratulated on a fine piece of work. The volume is a big "buy" at the price, and of course this was only made possible in this day of high publication costs by many generous contributions of funds and of time, as is evident from a reading of the acknowledgments. The volume should be at the right hand of all serious bird students of the East and South. Those of the West will be interested in finding so many of their birds wintering in South Carolina, while bird lovers everywhere will derive much satisfaction from owning a copy, and will profit by its perusal.—HERBERT L. STODDARD, SR.

**The Cycle in the Gambel Sparrow.**—Blanchard, Barbara D., and Erickson, Mary M. Univ. Calif. Publ. Zool., 47 (11): 255–318, pls. 19–25, 16 tables, Oct. 28, 1949. Price \$1.50.—The present paper supplements the earlier study by Dr. Blanchard on two other subspecies of the White-crowned Sparrow (*op. cit.*, 46: 1–178, 1941), and adds important data confirming the previous conclusion that the reproductive cycle of the species is substantially an annual rhythm, modifiable only within narrow limits by environmental conditions.

Microscopic study was made of the testes of wintering males taken at two distant localities in California (Davis and Santa Barbara), and in two different years at Santa Barbara. The same stages in gonadal development were observed as described in the earlier paper, but a clearer picture is given of the incidence of recrudescence. The earliest recognizable change in structure was found in the development of Leydig cells in the intertubular tissue, that were completely absent up to a critical time. The earliest date of record for the initiation of this change was January 5 and the latest, at another place and year, February 4.

Volume and weight of the testes were found to be of little service in the establishment of the incidence of cytological change, due to the great amount of individual variation. The first average increase noted in volume above the maximum point of the winter fluctuations occurred some 50 days after the first appearance of the Leydig cells, and the first such increase in weight was noticeable nine days still later. It was concluded that gross field observation could not supply useful data on this early stage of development. The greatest increase in weight and volume appeared to be developed during the actual course of migration. The testicular cycle of young males was found to parallel that of the wintering adults, except that testis size in the young birds averaged slightly less than that of the adults on any given date.

Deposition of fat appeared to occur within a brief period immediately preceding migration, beginning about 12 days in advance of the movement. The earliest signs of the prenuptial molt were recorded on February 4; a slightly earlier date, January 28, is cited from other observers at Pasadena.

All these factors were correlated with various meteorological conditions—hours of daylight, solar radiation, temperature, and precipitation—during the periods concerned. As in the earlier experiments with the other subspecies, recrudescence was initiated at the time of the greatest severity of weather when the least meteorological change was in progress. At the time of the actual departure of the birds on migration, no definite alterations in the weather could be found to show evident correlation.

While, as the authors admit, there is no certain proof that there is a definite connection between gonadal change and migration, the evidence points to a cyclic chain of related factors beginning with the development of Leydig cells in the testes and culminating in the sexual and territorial activities on the nesting grounds. It is probable that the Leydig cells are, themselves, one source of the male hormones that are responsible for the subsequent secondary sexual characters of male behavior.



There are noted in the account various additional characteristics of the form under discussion—the distance covered in its migration, the proportions of adults and young at the autumn arrival on the wintering grounds, the quite restricted winter range of individual flocks, the voices of the two sexes, the increase of song in the spring, and such matters. These add to the completeness of the report and are taken into consideration with the other accumulated data. The authors' contention seems well supported that the entire cycle of breeding activities, including migration, forms a coherent annual rhythm on which local conditions may, at certain points in the cycle, have some additive effect, but that the process began long in advance of these conditions which, therefore, can not have been the primary cause of the incidence.

These conclusions must be compared with those reached by Alden H. Miller (*Journ. Exper. Zool.*, 109: 1-11, 1948) in his experiments with the congeneric Golden-crowned Sparrow. It will be recalled that, in these experiments, progressive increments of light begun on November 20 produced gonadal development in size and weight by February and March, while similar increments begun on October 20 before the testes had reached their lowest point of quiescence, not only failed to elicit a response but actually delayed normal development in the following spring. Dr. Miller's conclusions were, therefore, that the inherent rhythm of the Golden-crowned Sparrow is an imperfect timing device of only broad significance while photoperiodic stimulation provides the precision.

The two conclusions are, perhaps, not wholly incompatible, but correlation is difficult owing to the different techniques and objectives. Miller's experiments were conducted on caged individuals of a different species, and the increments of light were abnormally rapid and commenced with a sudden incidence of a half-hour's duration above normal. At the time the first gonadal development in the intertubular tissue was observed in the Gambel's Sparrow, there was no such increment nor daily total of light in occurrence, nor was there for some time thereafter, and observable changes in gonadal size and weight were not found until nearly two months after the appearance of the Leydig cells. Miller did not report on the microscopic structure on which Blanchard and Erickson base much of their results.

Miller admits the existence of an inherent rhythm, and Blanchard and Erickson admit a limited amount of influence on the rhythm by meteorological conditions, including light. There is thus a common meeting ground. One general conclusion seems inescapable at this point in the problem. There is a basic rhythm on which light, among other possible conditions, can exert a certain amount of influence. Perhaps, as may be the case with birds that winter or live throughout the year in the tropics, the rhythm alone is sufficient to insure the continuance of the cycle at critical times. There is much in the present paper to suggest that this explanation is near the mark.—JOHN T. ZIMMER.

**Guide to the Birds of the USSR.**—G. P. Dement'ev, N. A. Gladkov, E. S. Ptushenko, and A. M. Sudilovskaya (Moscow), pp. 1-449, 132 line drawings, 1948. Price, \$1.75. (in Russian, latin name indices, no foreign language summaries).—As editor and senior author of 'Guide to the Birds of the USSR,' G. P. Dement'ev completed preparation of the text before World War II. The outbreak of war delayed publication until 1948. Binding and paper of the edition in hand are of poor quality, reproduction of line drawing is inferior, but the type and general organization of the book are clear, readable, systematic, and generally easy to use.

The book is based upon two other general works that appeared in the Soviet Union during the past decade. The principal one of these is the 'Complete Guide to the Birds of the USSR,' appearing under the co-authorship of Buturlin and Dement'ev



in five volumes from 1934 to 1941. This constitutes a detailed and thorough conspectus of all the species and subspecies of birds occurring in the USSR with considerable attention paid to the geographic ranges; it also includes sections on general avian biology. It is unfortunately a work not readily available in America. The second general work of interest appeared in 1940 and is entitled 'Textbook of Ornithology.' The principal author and editor is G. P. Dement'ev. This is a very broad work on the subject including chapters on anatomy, physiology, life histories, ecology, and general systematics of birds of the world. Although the volume under review is largely based upon the two foregoing, it is by no means repetitious and constitutes the first single-volume publication in which a Soviet student can find a compact, comprehensive guide to all species occurring within that vast region.

'Guide to the Birds of the USSR' includes brief descriptions of 680 species known to occur, nesting or transient, within the Soviet Union as of July 1, 1945, the original manuscript having been constantly brought up to date during the war and directly before going to press. Dichotomous keys for identification of the orders, families, genera, and species are based upon material in the Zoological Museum, Moscow University. They do not deal largely with field characters and would be primarily helpful to the student with a bird in the hand. The illustrations, which consist for the most part of detail drawings of heads and feet, were prepared by A. A. Zachvatkin and N. N. Kondakov.

It is of interest to quote from the first paragraph of the introduction: "The bird fauna of the USSR consists of 679 species as follows: Rasores 20, Turnices 1, Columbae 11, Pterocletes 4, Ralli 11, Lari 33, Alcae 17, Gaviae 4, Colymbi 5, Tubinares 10, Anseres 52, Steganopodes 11, Gressores 22, Accipitres 46, Striges 18, Cuculi 6, Caprimulgi 3, Coraciae 8, Upupae 1, Macrochires 5, Picarae 13, Passeres 294. Thus we have 679 in all." It will be noted that only 595 species are listed. The Grues, Otidae, and Limicolae have been omitted. Referring to the check list in the appendix we find eight Grues, three Otidae, and 73 Limicolae, which bring the total up to 679 as stated. However, the check list actually shows 680 species numbered from one to 680. It develops that the authors recognize 53 species referable to the Anseres (not 52 as in the above cited paragraph). While it is regrettable that editorial inconsistencies of this nature do occur throughout the book, they should not divert one from appreciation of the fact that 680 species actually have been listed and described (compare the 600 more or less occurring in North America). Subspecies are noted where particular interest attaches to them, but they are not dealt with in detail. They are included in the check list, but not taken into account in the figure of 680 mentioned above. Though taxonomists may dispute some of the authors' choices in classification, it is obvious that their nomenclature results from thorough familiarity with recent literature as well as extensive first hand experience with the palearctic avifauna.—DAVID G. NICHOLS.

**The Moas of New Zealand and Australia.**—Oliver, W. R. B. Dominion Mus. (Wellington, N. Z.) Bull. No. 15, 206 pp., 143 figs., 31 tables, August, 1949.—This valuable monograph results from a re-examination of material reported upon by Archey in 1941, as well as that of others, and inclusion of studies of bones uncovered since that date. The main localities from which moas have been recovered are described and often illustrated; the history of discovery is also reviewed.

After discussing the general structure of moas, including eggs and soft parts where available, the author describes all the genera, subgenera, and species. He further proposes three new species of *Pachyornis*, one of *Euryapteryx*, two of *Dinornis* and sets up a new genus *Zelornis*. Some of the species seem to be based upon minor

qualitative differences, the major characteristics being quantitative. When one examines carefully some of the measurements, even these quantitative features fade away; the supposed differences in size should also be viewed with caution since animals of this magnitude often show considerable variation in size. Indeed, in the species *Pachyornis elephantopus*, of which there are perhaps the most specimens available, we find great variation in most dimensions.

Of outstanding value are the tables of measurements and the many excellent photographs of various elements; the measurements would have had more interest perhaps if they had been statistically analyzed to support some of the statements in the text.

The last part of the bulletin contains interesting information and speculation on the habits, the origin, and the evolution of the moas. There is a selected bibliography (from the more than 400 papers on the moas) which is classified by subjects.—H. I. FISHER.

**A North Carolina Naturalist / H. H. Brimley / Selections From His Writings.**—Edited by Eugene P. Odum. (Univ. N. Carolina Press, Chapel Hill), xvi + 205 pp., 44 photos., 1949. Price, \$3.50.—This is a collection of popular writings by Brimley who directed the North Carolina State Museum from 1895 to 1937. Included are some unpublished manuscripts which, incidentally, would have been of greater historical interest if the date of writing could have been given in all instances.

Diverse subjects—"Whales," "I like Blue Jays", "Foot-rule and Scales," and "Old Times on Currituck"—are discussed in lively and interesting fashion. Of special interest is the section on conservation which mentions early references to world-wide conservation and the history of conservation activities in North Carolina. One illustrative example of change of attitude and feeling is that in 1884 he had to be classified as a "Fertilizer Inspector" before he could be hired to prepare mounts of waterfowl and fishes. As early as 1920 Brimley pointed out (p. 73) that bird conservationists overstressed the economic value of birds and tended to neglect the esthetic and sentimental aspects.

The last part of the book treats of the history and development of the N. C. State Museum.—H. I. FISHER.

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#### OBITUARIES

CHARLES DEAN BUNKER, elected a member of the A. O. U. in 1923, died at his home in Lawrence, Kansas, on September 5, 1948. Bunker, the youngest of seven children, was born in Mendota, Illinois, on December 12, 1870. His childhood was largely spent in the out-of-doors rather than in the school room, owing to the advice of the family physician. This may have had much to do with developing in Bunker an interest in natural history, for a great deal of his time was spent in collecting and

observing animals. Those which he collected he gave to the local taxidermist, possibly in return for instruction in taxidermy. One of the birds collected by the boy was the last Passenger Pigeon to be shot in Mendota.

At the age of 25, Charley Bunker went to work as taxidermist for Dr. L. L. Dyche, at the University of Kansas, with a salary of \$15 per month. In 1901 he left Kansas for the University of Oklahoma, remaining there until 1904. Then, after about a year in the field with Charles Sternberg, collecting vertebrate fossils, he returned to Kansas, to remain until his retirement in 1942. Even following his retirement he continued to pay regular visits to the University until his failing health prevented them early in 1948.

Bunker's work, after his return to K. U., was concerned with the care of scientific collections of Recent vertebrates in the Museum of Natural History which had been completed in 1901. Until 1909 he worked under the curatorship of Dr. Dyche. But when Dyche left the University, Bunker, under the title of Assistant Curator, was placed in charge of the Recent vertebrate collections.

Having a keen sense of responsibility regarding scientific collections, Bunker instituted a careful system of cataloging which has won for the Kansas museum a high reputation for scientific accuracy.

An even greater monument to Charley Bunker, however, is to be found in the large number of able scientists who, as college students, came under his influence at the museum. Although he held no teaching assignment at the University, owing to his lack of formal education beyond the grammar school, many students received the most valuable part of their training as naturalists by contact with him at the museum. Capitalizing, we might say, on his lack of scientific education, he assigned the students tasks in the museum with the understanding that he depended upon them for scientific accuracy. Furthermore, he gave them to understand that he relied on them to build up the scientific collections and keep the museum alive. This system for developing responsibility, together with his great generosity in putting his own and museum equipment at the students' disposal, endeared him to these young people who gained so much from his influence.

Although he trained students in a knowledge of all vertebrates, Bunker's great interest was in birds. He published very little himself, however, preferring to have any new observation go to the credit of one of the students.

A living memorial to Charles Dean Bunker was erected shortly before his death by the Kansas University Endowment Association—a loan fund bearing his name, for needy students of natural history at the University.—HILDEGARDE HOWARD.

GEORGE CLYDE FISHER, an Associate of the American Ornithologists' Union for 35 years (1908-38 and 1943-48), died in New York, N. Y., Jan. 8, 1949, at the age of 70. He was born near Sidney, Ohio, May 22, 1878, graduated from Miami University in 1905 with the degree of A.B., from Johns Hopkins University in 1913 with the degree of Ph.D. and in 1926 received the degree of LL.D. from his alma mater.

In 1913 he joined the American Museum of Natural History in New York and for 11 years served as assistant curator and associate curator in the department of public education. He was then made curator of visual instruction in 1924, a post which he filled for 10 years. In 1923, he was placed in charge of the department of astronomy, made curator in 1928, and head of the Hayden Planetarium in 1935.

Dr. Fisher's publications on birds were apparently limited to a few brief notes in 'The Auk' for 1910 and 1919, chiefly on the occurrence of uncommon birds. He was a member of the Wilson Ornithological Club and the American Society of Mammalogists, a fellow of the Linnean Society of New York and a member of the Ex-



plorer's Club, of which he was president at the time of his death. He was also a member of the American Association for the Advancement of Science, the Nature Study Society and the Torrey Botanical Club. His deep interest in astronomy in later years resulted in membership in the Astronomical Society, the Association of Variable Star Observers, the Society for Research in Meteorites, fellowship in the Royal Astronomical Society and the presidency of the Amateur Astronomical Association.—T. S. PALMER.

ROBERT HALL, an Honorary Fellow of the American Ornithologists' Union since 1923, died at Hobart, Tasmania, on September 19, 1949, in his eighty-second year. Born in Australia, he had been a curator of the Tasmanian Museum since 1908. In his younger years he undertook expeditions to Northern Siberia (Lena River), the Kerguelen Islands, and northern India. Later he concentrated on the study of birds of Australia and Tasmania, of which he was one of the outstanding authorities. He published numerous papers in ornithological journals, as well as four or five books. A more detailed obituary can be found in 'THE EMU' (49: 194-195, 1949).—E. MAYR.

SADIA HASKELL, a Life Associate of the American Ornithologists' Union, died at Riversdale, Md., October 5, 1947, at the age of 78. She was born in Rock Island County, Illinois, June 26, 1869, and was a trained and experienced accountant and auditor. In 1902 she received an appointment in the U. S. Department of Agriculture where she served for 37 years in the Bureaus of Chemistry, Entomology and Agricultural Economics. She retired in 1939. Miss Haskell was elected an Associate of the Union in 1916 and was known to many of the members through her regular attendance at the annual meetings prior to World War II.—T. S. PALMER.

SUSIE FAIRFIELD DRYDEN KUSER (Mrs. Anthony Rudolph Kuser), an Associate of the American Ornithologists' Union beginning in 1910, was born in Brooklyn, N. Y., on March 27, 1870, the daughter of John Fairfield and Cynthia Fairchild Dryden. On December 1, 1896, she was married to Anthony R. Kuser, financier and philanthropist, who died in 1929 (Auk, 46: 579-580, 1929). They had two children—a daughter, now Mrs. Cynthia Kuser Herbst, and a son, John Dryden Kuser.

Both Colonel and Mrs. Kuser were lovers of wildlife, especially birds, and were active in Audubon Society promotion. Their estate at Bernardsville, N. J., was a bird sanctuary and aviary and included areas for pheasant rearing. In 1922 they donated to the State of New Jersey a tract of 10,500 acres (including the highest point in the State) near Sussex, N. J., as a public park and wildlife sanctuary. Perhaps their principal benefaction for the science of ornithology was the financing of the Kuser Expedition of 1909-11, organized under the auspices of the New York Zoological Society and conducted under the leadership of Dr. William Beebe. This expedition undertook a journey of nearly 52,000 miles through more than 20 countries of the Orient, making intimate studies and collecting specimens of all known species of pheasants. The result was Beebe's sumptuous four-volume 'Monograph of the Pheasants,' published in 1918-22 with the financial assistance of the Kusers, and the subsequent two-volume edition, 'Pheasants: Their Lives and Homes' (1926).

Mrs. Kuser was a life member of the New Jersey Historical Society. In January, 1932, she sailed for Europe with her daughter, hoping that the trip would benefit her health, but she died suddenly at Rome, Italy, on March 10, 1932. Burial was at Bernardsville, N. J.—PAUL H. OEHSE.

THOMAS TONKIN MCCABE, an Associate of the A. O. U. since 1920, and elected a Member in 1938, died of heart failure in Berkeley, California, on January 28, 1948. He was born April 4, 1890, in Bloomington, Indiana, where his father was professor

of Romance Languages at the University. He attended the Middlesex School in Concord, Massachusetts, from 1900 to 1908, and then entered Harvard. From Harvard he received the degrees of B.A. and M.A.

In 1915 his bride of only a month was drowned in an accident in which he, too, was badly injured, and his heart severely strained. While recuperating, he lived in the White Mountains of New Hampshire. Here he became interested in natural history, and particularly in botany, through the friendship of Mrs. Frank Bolles, whose daughter later became his wife.

In the first World War, McCabe served in the British Royal Field Artillery, attaining the rank of captain. Following the war, he was instructor in English, first at Yale and then at the Naval Academy at Annapolis, but had to resign in 1921, owing to ill health. In 1923 he married Elinor Bolles of Cambridge, Massachusetts, and moved to British Columbia where he had previously bought a tract of land. Here, he and his wife spent several years living in the woods and studying the flora and fauna, gradually widening their sphere of interest to include much of the southern half of the province. In 1929 they moved to Berkeley, California, where Mr. McCabe could have access to museums and libraries during the winters, while continuing their field trips every summer. When the war curtailed extensive field work, he undertook a special study of mice in the Berkeley region.

Mr. McCabe became affiliated with the University of California as Research Associate in Botany and turned over his collections of mammals and plants to the University during his lifetime. His bird collection, however, he sent to his alma mater, Harvard, for the Museum of Comparative Zoology, where he held the title of Associate in Ornithology at the time of his death.

In addition to a number of short papers on birds published in the ornithological magazines in America, Mr. McCabe wrote, or co-authored, several works on rodents, two of which appeared in Canadian publications.—HILDEGARDE HOWARD.

HAROLD MICHENER, Associate of A. O. U. in 1926, Member in 1938, died at his home in Pasadena on October 14, 1949. Born at Boulder Creek, California, May 31, 1882, son of a fruit grower, he grew up in the Santa Cruz mountains, his interest in nature encouraged by his parents. He graduated in engineering at the University of California and was associated with the Southern California Edison Company from 1912 until his retirement in 1942.

He married his schoolmate, Josephine Rigden, and together they banded birds in their garden in Pasadena. Their sons are natural scientists, David a plant physiologist with the U. S. Department of Agriculture at Berkeley, and Charles an entomologist at the University of Kansas. Mr. Michener was one of the founders of the Western Bird Banding Association and was the guiding spirit of the Los Angeles Chapter.

The Mitcheners banded over 45,000 birds of 85 species. They kept meticulous notes on their subjects, particularly on molts and plumages. The scope of their work is shown by the titles of their major papers published in "The Condor": Banding Purple Finches in Pasadena, 1925; What Color is the Eye of a Bush-Tit? 1928; Some Inferences from Seven Years' Banding Records, 1932; Abnormalities in Birds, 1936; Bars in Flight Feathers, 1938; The Spring Molt of the Gambel Sparrow, 1943. Five detailed articles were published on House Finches: Studies on 1170 Banded House Finches, 1926; Variation in Color of Male House Finches, 1931; Colors Induced in Male House Finches by Repeated Feather Removals, 1932; Ages of House Finches Trapped During February, 1933, at Pasadena, California, 1933; The Molt of House Finches of the Pasadena Region, California, 1940. A remarkable study carried out

with the help of colored bands was made on Mockingbirds, *Their Territories and Individualities*, 1935. Finally, after banding was no longer possible due to severe arthritis, Mr. Michener published with Dr. D. S. Farner 'A Proposed System of Age Terminology in Bird Banding,' *Bird-Banding*, 1948.

For many years I knew the Micheners through their papers and their delightful letters. When in 1948 I was privileged to visit then I was deeply impressed with the serenity and cheerfulness of Mr. Michener, with his courageous acceptance of his terrible handicap and with the selfless devotion of his wife. Harold Michener was a true friend and an inspiration; his work was of the highest quality, both his own contributions and his encouragement of other students.—MARGARET M. NICE.

ELIZABETH DAY PALMER, a Life Associate of the American Ornithologists' Union, died at her home in Los Angeles, Calif., Dec. 4, 1945, at the age of 73. She was the daughter of Henry Austin and Jane Day Palmer and was born in Oakland, California, Nov. 30, 1872. She graduated from the University of California in the class of 1894. Shortly after her graduation she began teaching in the public school at Claremont and later taught in the Los Angeles High School until her retirement in 1937.

Miss Palmer was a member of the Cooper Ornithological Club and was elected an Associate of the A. O. U. in 1918.

She was fond of travel and visited a dozen countries in western Europe, China, Korea, and Japan and made a trip around South America. Her voyages extended from the arctic circle off the coast of Norway to the Fiji Islands in the South Pacific. Among the institutions which she visited was the La Plata Museum in Argentina, the Natural History Museum in Stockholm, Sweden, and the museums in Tokyo, Japan.—T. S. PALMER.

ARTHUR LINCOLN REAGH, an Honorary Life Associate of the American Ornithologists' Union, died at West Roxbury, Mass., June 15, 1949, in his 78th year. He was the son of Abraham Lincoln and Clara Isabel (Goodwin) Reagh and was born at West Roxbury, August 21, 1871. His education was at Harvard University, from which he graduated with the degree of S.B. in 1894 and M.D. in 1898. After graduation he received an appointment as Bacteriologist in the Massachusetts State Department of Health.

Reagh was elected a member of the Nuttall Ornithological Club in 1891, an Associate of the A. O. U. in 1896, and became an Honorary Life Associate in 1936. Apparently his only contribution to 'The Auk' was a brief note on the occurrence of the King Rail in Plymouth Co., Mass., in 1903.—T. S. PALMER.

JOHN BONNER SEMPLE, who became an Associate of the A. O. U. in 1924, and who was a Life Associate at the time of his death in Sewickley, Pennsylvania, on November 13, 1947, was born in Pittsburgh on August 20, 1869.

He attended John Way Jr.'s Sewickley Academy, the Pennsylvania Military Academy at Chester, and graduated from Lehigh University in 1892 with a degree in chemistry.

During World War I, he served as Lieutenant Commander, U. S. Naval Reserve, invented a tracer shell, and organized a company for its manufacture. Retiring from business after the war, he served as a trustee of both Carnegie Institute of Technology and the Carnegie Institute. During the years he served on the Institute's Museum Committee, his generosity and active participation in expeditions added thousands of birds to the collection. He took part personally in the Blue Goose expeditions to Hudson Bay in 1923 and 1926 and sponsored the work on

Southampton Island in 1929-1930, at which time the second known nesting grounds of this species were found. In 1931 he sponsored and took part in an expedition to Churchill, Manitoba, which resulted in the discovery of the eggs of the Harrie's Sparrow. He made several collecting trips to the southwestern United States from 1932 to 1937 and collected birds in Mexico in 1938 and 1939.

A Blue Jay, *Cyanocitta cristata semplei*, a Screech Owl, *Otus asio semplei*, and an arctic weasel, *Mustela erminea semplei*, have been named for him. The Semple Islands, in northern Hudson Bay, bear his name.

Among the friends who miss him most are those who learned to enjoy, through years of close association, his great enthusiasm for field work, his hearty enjoyment of good food, and his youthful spirit and ever-ready wit.—GEORGE MIKSCHE SUTTON.

JOHN VAN SCHAICK, an Associate of the American Ornithologists' Union (1926), died in Washington, D. C., May 16, 1949, at the age of 75. He was born in Cobleskill, N. Y., Nov. 18, 1873, and graduated from Union College with the degree of B.A. Later he received the degrees of D.D. from St. Lawrence University and M.D. from the University of Liege, Belgium. He served as pastor of the Universalist Church in Washington, D. C., from 1900 to 1918. Prior to World War I, he took an active part in the civic and social work of the National Capital, serving as President of the District Board of Education and chairman of the Board of Charities, which later became the Department of Public Welfare.

For some years Dr. Van Schaick was associated with the American Red Cross, and at the beginning of World War I was detailed as Director of Relief in Belgium. As a result of this work he received decorations from several European governments and medals and recognition from American societies and organizations. He was an easy and prolific writer and for several years was editor of the 'Christian Leader' of Boston. While associated with that paper, he contributed from time to time a series of delightful essays on birds and nature which were later published in book form in 1928 under the title 'Nature Cruisings.'

He was an enthusiastic member of the Audubon Society of the District of Columbia, took an active part in the field trips of the society and was familiar with most of the birds which occur in the region of the national capital.—T. S. PALMER.

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JANUARY 1, 1900

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SIR:

I have the honor to acknowledge the receipt of your letter of the 29th inst. in relation to the above subject.

The Bureau has the honor to inform you that the same has been forwarded to the proper authorities for their consideration.

Very respectfully,  
J. D. [Signature]

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JANUARY 1, 1900

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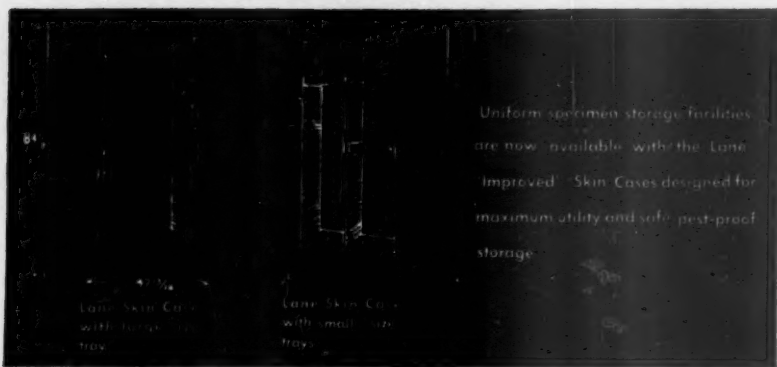
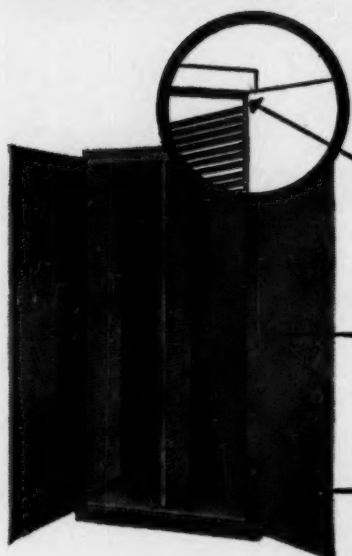
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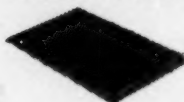


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